LEWIS AND CLARK COUNTY, HELENA AND EAST HELENA

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LEWIS & CLARK COUNTY, HELENA AND EAST HELENA

PRE DISASTER MITIGATION PLAN

I. PLAN ADOPTION: This plan has been adopted by the local jurisdictions. See appendix for the adoption resolutions.

A. LETTER OF TRANSMITTAL (see appendix).

B. ACKNOWLEDGEMENTS

The Pre-Disaster Mitigation Plan for Lewis and Clark County would not exist except for the work and vision of the personnel who served on the various committees that wrote the plan.

C. PREFACE

This plan focuses on the three major hazards confronting the county and two incorporated cities, Helena and East Helena: earthquake, flood and wildfire. The mitigation steering committee selected these three major hazards because they have caused numerous major disasters in the past and are expected to do so in the future. The vulnerability to these three hazards is far greater than the other hazards addressed in this plan. Other hazards addressed at the Local Emergency Planning Committee (LEPC) meetings were hazardous materials, winter storms, tornadoes, hail, drought, dam failure, and landslides.

Warning and evacuation plans exist for the six dams in the county, and tornadoes have not proven to be a major threat. A few cold core funnel clouds have been spotted over the years near the mountains between the Helena Airport and the town of York in the eastern part of the county. No damage has been recorded from tornadoes in the county.

D. EXECUTIVE SUMMARY

This plan reviews the history of disasters caused by earthquake, flood and wildfire in the county, the mitigation steps that have been adopted to reduce the risk and the proposed mitigation actions that can be taken to continue to reduce the risk of these three major threats to the county.

All terms used in this plan will be spelled out to prevent confusion. The most important term to be defined is mitigation, which means reducing the need to respond through actions taken before disaster strikes. Mitigation will reduce fatalities, casualties and damage because of steps taken ahead of time, such as flood proofing buildings, thinning heavy fuels or removing heavy objects from high places to prevent them from falling in an earthquake.

Therefore, this plan will focus on mitigation projects that reduce the disaster threat, rather than review the capabilities of the first response agencies in terms of planning, organization, training and equipment. These cornerstones of a community's disaster response program are extremely important to saving lives and property, but are not within the purview of this plan.

E: INTRODUCTION

COUNTY DESCRIPTION

Lewis and Clark County is located in west central Montana and it is 107 miles long and 76 miles wide, with an estimated population of 56,554 on July 1, 2002, according to the U.S. Census Bureau. Helena, the state capitol, has a population of about 26,000; East Helena has about 1650 people; and the Helena Valley is estimated at 18,328. Small, unincorporated towns are located north of Helena with estimated populations in parentheses. Wolf Creek (100); Craig, (100); Augusta, (400); and Lincoln, (1100). Lincoln is the only sizeable community west of the Continental Divide in the county. See the appendix for the county population density map.

The northwestern third of the county is very rugged and generally uninhabited. Portions of the Scapegoat and Bob Marshall Wilderness areas are in this part of the county. Several stream headwaters are also included in this mountainous region. The Helena and Flathead National Forests cover about half of the county, and the Continental Divide of the Rocky Mountains runs down the center of the county.

The projected 2010 population for the county is 63,316, up from 55,716 in the 2000 census, which would be a 14 per cent increase. From 1970 to 2000, the population growth rate in unincorporated portions of Lewis and Clark County, outside of Helena and East Helena, was 218 per cent, the highest of any unincorporated area in Montana.

Helena is home to the state capitol and has many state, federal and local government employees that live and work in the area. Government, retail and services comprise the mainstay of the local economy.

The rest of the county relies on agriculture and tourism for jobs. The agriculture statistics for 2002 show that barley was the biggest crop harvested, at 548,000 bushels, with a rank of 19 in the state. Wheat was the second biggest production crop, coming in at 322,000 bushels, with a 27 ranking in the state out of 56 counties. Hay was measured at 100,000 tons.

There were 40,000 head of cattle in the county for 2002, and about 4,000 sheep. There were 502 ranches and farms in the county in 1997, the last year that data was available from the Census of Agriculture.

There are no sawmills in the county, except for a post and pole operation in Lincoln. Less that four per cent of the harvested timber is from federal forests. Most of the timber harvest comes from private or state lands.

The trend for logging and milling is down, with a corresponding increase in recreational use of the forests. The Missouri River corridor has proven to be especially popular for fishing, boating and camping

CLIMATE

The climate is semi-arid with an average rainfall of 11.5 inches annually. A rain shadow between the Scratchgravel Hills in the West Valley and Canyon Ferry Lake results in annual precipitation in that area at only about seven inches. Winters are cold, with warming Chinook winds that blow out of the northwest that typically terminate any lengthy cold spell. The coldest temperature recorded in the lower 48 states occurred at Flesher Pass near Lincoln in 1949, with a recording of 70 degrees below zero.

Summers tend to be dry and hot. Temperatures over 100 degrees are occasionally recorded.

Heavy wet snow can cause rapid snowmelt floods, especially in late winter. The hazards threatening the population, development and infrastructure of the county will be reviewed in this plan.

F. PURPOSE: The purpose of this plan is to reduce the threat of disaster from the three major natural threats to the county: flood, wildfire and earthquake.

G. SCOPE: The scope of this plan encompasses the entire county, including the incorporated cities of Helena and East Helena.

H. AUTHORITY: This plan is adopted under the authority of the Disaster Mitigation Act of 2000, Section 322 and 44 CFR, Parts 201 and 206.

I. GOALS: The goals and objectives in this plan are outlined throughout the text and will be addressed throughout the plan.

J. DEFINITION OF TERMS AND ACRONYMS:

BLM: Bureau of Land Management

DBH: Diameter at Breast Level

DNRC: Department of Natural Resources.

DES: Disaster and Emergency Services.

ERC: Energy Release Component.

FEMA: The Federal Emergency Management Agency

100-year flood: A flood that has a one per cent chance of occurring, and a 23 per cent chance of occurring in a 25-year period.

GIS: Geographic Information Services

HAZUS: Hazards United States – a loss estimation computer software program.

HIDC: Helena Inter-Agency Dispatch Center.

LEPC: The Local Emergency Planning Committee that represents the public and private sector in planning for disasters and emergencies in the county.

LIQUEFACTION: Ground failure caused by seismic shaking in alluvial soil with a high water table.

Mitigation: Sustained actions taken to reduce or eliminate long-term risk to people, property and the environment from the effects of hazards.

NRCG: Northern Rockies Coordination Group.

NOAA: National Office of Atmospheric Administration.

PDM: Pre-Disaster Mitigation.

USFS: United States Forest Service

WUI: Wildland/Urban Interface.

II. PLANNING PROCESS

The planning process utilized the Lewis and Clark County Local Emergency Planning (LEPC) Committee and the Tri-County Fire Working Group (TCFWG) as the primary committees that addressed mitigation. The TCFWG served as the wildfire mitigation committee, because it does this for a three county area. A Lewis and Clark County Mitigation Steering Committee, with representation from the cities of Helena and East Helena, formed to develop and write the plan.

TCFWG is composed of local, state and federal fire agencies and private contractors that participate in fuel hazard reduction projects in the three county area, including Lewis and Clark County.

The LEPC consists of a 20-member committee representing the public and private sectors to plan for the mitigation, response and recovery from natural and man-made disasters. Members of the LEPC come from city/county emergency management, city and county law enforcement, city and rural fire departments, public works departments, the city-county health department, CONOCO, the Yellowstone Pipeline, Northwest Energy, KMTX Radio Station, the Red Cross and the county commissioner's office.

The Lewis and Clark County Hazard Mitigation Plan of April, 1999 served as a starting point for the planning process. Other plans that were useful were the Capital Improvement Plans of the county, Helena and East Helena. The county and city Growth Policies were also referenced during the planning process.

LOCAL EMERGENCY PLANNING COMMITTEE MEMBERSHIP:

Paul Spengler, DES Coordinator and chairman.
Fritz Zettel, Helena Fire Dept.
Kevin Skaalure, KMTX Ratio Station.
Pat McKelvey, Office of Prevention and Mitigation.
Greg Peterson, Chemical Montana Company.
Mark Lerum, Helena Police Dept.
Joan Bowsher, Health Dept.
Ellen Bell, Red Cross,
Brett Lloyd, Helena Fire Dept.
Leo Dutton, Sheriff's Office
Larry Ferguson, Yellowstone Pipeline
Gary Palm, Northwestern Energy
Dave Mason, Rural Fire Council
Tom Cohn, Helena School District

The mitigation steering committee consists of the following membership:

Paul Spengler, Lewis and Clark County Disaster and Emergency Services Coordinator

Pat McKelvey, Lewis and Clark County Office of Prevention and Mitigation Manager

Sharon Haugen, Lewis and Clark County Community Development and Planning Director

Mike Murray, Lewis and Clark County Commissioner

Phil Hauck, Helena Public Works Department Assistant Director

Dave Powell, Helena Public Schools Facilities Manager

Jim Rice, East Helena Public Works Superintendent

It was then determined that subcommittees should address the three identified major hazards in the county. These committees are the flood, earthquake and wildfire committees.

FLOOD SUBCOMITTEE
Paul Spengler, Lewis and Clark County Disaster and Emergency Services Coordinator
Pat McKelvey, Lewis and Clark County Office of Prevention and Mitigation Manager
Barry Damschen, Damschen Engineering, Inc.
Dave Korang, Lewis and Clark County Public Works
Wayne Effertz, Lewis and Clark County Public Works
Joan Bowsher, City/County Health Department
Quentin Miller, Montana Department of Transportation
Kathy Chase, United States Geological Survey
James Wilbur, Ten Mile Creek Watershed Group
Sanna Yost, Morrison-Maierle Engineering Company

EARTHQUAKE SUBCOMMITTEE

Paul Spengler, Lewis and Clark County Disaster and Emergency Services Coordinator
Pat McKelvey, Lewis and Clark County Office of Prevention and Mitigation Manager
Brandt Salo, Helena Senior Building Official
Frank Rives, Lewis and Clark County Community Development and Planning Department
Dave Powell, Helena School District
Joe Furshong, Helena School District
Michael Barros, Helena Community Development and Planning Director
Tony Perpigano, Crossman-Whitney-Griffin Architects

WILDFIRE SUBCOMMITTEE

The wildfire subcommittee consisted of the Tri-County Fire Working Group, which has been working on public education and mitigation for wildfires since 1987. The Lewis and Clark County membership of this group is as follows:
Rocky Infanger, Montana Prescribed Fire Services and Wolf Creek Fire Chief
Jerry Shepherd, West Valley Fire Chief
Cheryl Liedle, Lewis and Clark County Sheriff
Amy Teegarden, United States Forest Service
Brett Ruby, United States Forest Service
Dave Larsen, United States Forest Service
Duane Harp, United States Forest Service
Michael McHugh, Lewis and Clark County Community Development and Planning Department
Lucy Morrell-Gengler, Helena Community Development and Planning Department
Mike McFerrin, Montana Prescribed Fire Service
Gary Ellingson, Northwest Management, Inc.
Rick Grady, Department of Natural Resources and Conservation
Kevin Skaalure, KMTX Radio Station
Pat McKelvey, Lewis and Clark County Office of Prevention and Mitigation Manager
Paul Spengler, Lewis and Clark County Disaster and Emergency Services Coordinator
Terina Mullen, Bureau of Land Management
Craig Trapp, Helena Fire Marshall
The subcommittees met periodically, usually monthly, to review hazards and brainstorm mitigation projects. The subcommittee reports were taken to the steering committee for review and approval.

PUBLIC MEETINGS

Public meetings were held in Lincoln, Augusta, the Helena Valley and Helena during the planning process. The meeting agendas and a press release are in the appendix.

III. RISK ASSESSMENT

A. HAZARD IDENTIFICATION:

1. FLOOD: Floods occur when streams or rivers overtop their banks and send water to low lying areas. People and development in the flood plain or in low-lying areas are at risk. Two types of flooding occur in the county: flooding causes by rains and melting snow in the spring, and rapid snow melt flooding, caused by melting snow on frozen ground, usually in February and March.

2. WILDFIRE: Wildfire threatens people and homes in the Wildland-Urban Interface. Lightning, trains, careless people and arson are the common causes of wildfires.

3. EARTHQUAKE: Strong ground motion caused by the shifting of plates beneath the surface of the earth. A catastrophic earthquake would be the worst disaster that could hit Helena, East Helena and the Helena Valley.

B. HAZARD PROFILES:

HAZARDOUS MATERIALS

Hazardous materials are always a threat, especially from truck and rail accidents. The cities of Helena and East Helena are bisected by a major Montana Rail Link rail line, as is the southern part of the county. Fortunately, rail accidents have not caused any hazmat disasters except for one described below.

The worst hazardous materials disaster in the county occurred when a Montana Rail Link train carrying a hydrogen peroxide tank car exploded at 4:50 a.m. on February 2, 1989 next to Carroll College. This resulted in the loss of power and heat in the city for most of the day when the temperature was 30 degrees below zero. Millions of dollars of damage occurred at Carrroll College and in surrounding buildings. About 2,500 people were evacuated for 24 hours until the resulting tank car fires could be controlled.

Two hazmat sites are included in the EPA's web site for air releases of reportable substances. The Columbia Paint Plant in Helena released 1823 pounds of ethylene glycol in 2002, and the American Chemet plant in East Helena released 12,779 of copper and zinc compounds during its manufacturing process. These chemicals are not extremely toxic substances. Reference: www.epa.gov/triexplorer/

Trucks ply I-15, which runs north and south through the county, and runs through the east side of Helena, and U.S. Highway 12, which runs through Helena and East Helena. There have been no major hazmat releases due to a truck accident for the past 25 years.

WINTER STORMS

Personal preparedness through public information and education holds the key to mitigation when preparing for winter storms. Recent winters have brought above average temperatures to the county, with below average snowfall. This has been unusual, because Lewis and Clark County holds the record for the lowest recorded temperature in the lower 48 states, which was 70 degrees below zero on January 20, 1954 on Rogers Pass near Lincoln, which is about 40 miles northwest of Helena.

Blizzards and severe winter weather have hit the county over the years. The most devastating blizzard struck during October 21, 1975 when approximately $500,000 of property was lost to the storm, and again in May of 1974, when over $55,000 of property damage occurred due to the storm. No fatalities or injuries were reported. The last major winter storm was recorded on February 1, 1989, when about $90,000 of damage occurred due to the severe cold and snow. See www.sheldus.org for more information about other, but less severe, winter storms in the county.

Citizens are reminded of the deadly effects of winter each fall during Severe Weather Week that is held in conjunction with the National Weather Service. A publicity blitz on radio, TV and the newspaper remind citizens to prepare for the oncoming winter season with personal preparedness kits and personal precautions to prevent getting caught unprepared in a blizzard or winter storm.

SUMMER STORMS

Hail has produced huge losses over the years, with the worst storm occurring on June 28, 1982, with property damage exceeding $5 million. Most of the damage occurred when golf ball size hail destroyed roofs in and around Helena. This was the worst hailstorm to strike the area within memory. Crop damage was reported to be about $5,000. No injuries were reported. Another major hailstorm hit the Helena area on June 6, 1976, which caused two injuries and about $500,000 worth of property damage.

Other significant and damaging hail storms that hit the county occurred in July and August, 1975, with a total of over $500,000 of damage. Two other hailstorms struck the county in June of 1976 and 1977 that also totaled over $500,000 of damage.

According to the National Weather Service, severe weather is most likely to hit the county during the months of June, July and August. Thunderstorm probability in June is 22%, July, 27% and 22% for August. There is a 15% chance of severe thunderstorms in June and a 17% chance in July. This is based on 62 years of weather data for the Helena area.

Lightning kills more Americans each year than floods, tornadoes and hurricanes. But there have Major storms can generate from 30,000 to 50,000 lightning strikes hitting the ground according to the Bureau of Land management. More than half of county wildfires are caused by lightning, and there were 133 lightning starts in the county during 2003.

Montana has had 34 lightning strikes that killed six people, caused 16 injuries and a total of $1,211,000, but there have been no reported deaths or injuries due to lightning in Lewis and Clark County.

A windstorm on October 16, 1991, produced property damage of $102,000 from fences and outbuildings that were blown down during the storm. This was the most destructive windstorm to hit the county in the past 25 years.

Rainstorms typically cause minor flooding and drainage problems during heavy downpours, but have not been responsible for major damage, injuries or fatalities. Helena has experienced furious downpours, but the drainage system has been able to handle the flows without serious flooding.

The public is warned to stay indoors during these summer storms and not to put themselves into harm's way by going near metal objects that attract lightning. (NOAA) Weather radio and local radio and TV stations broadcast warnings of these destructive storms. This a feature of Severe Weather Week Public Service Announcements each spring.

As a Storm Ready Community, Lewis and Clark County continuously promotes severe storm preparedness and mitigation**.**

LANDSLIDES

There have been no landslides that have resulted in documented damage or injuries in the county. Landslides are associated with earthquake activity, and the planning assumptions for landslides are on MacDonald Pass on U.S. 12 W. on the Continental Divide six miles west of Helena, and Wolf Creek Canyon on I-15 about 20 miles north of Helena. Landslides in these areas would cut a major arterial to Helena from the west and the north. Landslides are difficult to predict, but are often precipitated by high precipitation, overgrazing and deforestation caused by wildfire.

Destructive avalanches in the county that have caused injuries or damages have not been recorded.

DROUGHT

A Lewis and Clark County Drought Committee addresses the insidious nature of a long-term drought, which the county has experienced for the past seven years. The committee is composed of farmers, ranchers, emergency management, health department, the county commission and water treatment plant personnel.

Mitigation efforts that have been undertaken are public education and information to encourage water conservation. In extreme drought conditions the cities of Helena and East Helena urge voluntary water conservation. If this does not work, then mandatory conservation is promulgated through no water days every other day for urban irrigation. The Lewis and Clark County Water Quality District closely monitors Helena Valley wells, and documents the wells that stop producing.

The last time Helena instituted mandatory water rationing by allowing outdoor water use on certain days of the week, the public works director reported that water consumption increased because people watered more on their water days. This occurred about 18 years ago.

FLOODS

Most floods occur in Lewis and Clark County during the rainy season, which occurs during May and June, or in February, when rapid snowmelt floods have occurred. June is the wettest month of the year, with May a close second. Flooding has historically been more of a hazard for the Helena Valley and East Helena than for Helena. Major floods have occurred along Ten Mile, Prickly Pear and Trout Creeks in 1908, 1964, 1975, and 1981.

The 1908 flood was probably greater than a 100-year event, and was the largest flood in the Helena Valley until a greater than a 500-year flood hit in May 1981, when Ten Mile Creek in the West Helena Valley and Prickly Pear Creek in the East Helena Valley overflowed their banks. Lesser floods have occurred in 1879, 1892, 1917, 1938, 1949, 1953, 1955, 1956, 1957, and 1969.

A Presidential Disaster Declaration was received for the June 1975 and 1981 floods along Ten Mile and Prickly Pear Creeks. Elk Creek in Augusta, the Blackfoot River in Lincoln and Silver Creek in the Helena Valley also flooded in 1975, but did not flood in 1981. The total cost of public damage in 1975 was about $450,000 and in 1981, it was $660,000. The greatest damage to buildings and homes in 1975 were along Ten Mile Creek in the Helena Valley and Elk Creek in Augusta. Building basements in both areas were flooded, and some foundations were damaged.

Eight bridges washed away in the county during the 1981 flood, including five in Ten Mile Creek near Rimini, a town about 20 miles to the southwest of Helena. More than 300 homes were reported damaged in the county, and about 500 people applied for disaster assistance. Many of the homes were flooded in basements because of high ground water pushing though the basement walls and floors.

Rapid snowmelt floods have occurred in 1982, 1985, 1996 and 2003. A Presidential Disaster Declaration was made for the 1996 flood, which caused about $300,000 worth of damage to county roads and culverts. The damage from the 2003 flood was estimated at $125,000.

These floods are caused by heavy, large accumulations of wet snow that falls rapidly. For instance, nearly three feet of snow fell in a two-day period in March 2003, which caused a Helena Valley flood when the snow melted quickly.

Flooding occurs in the winter when a high pressure system brings in warm weather, which melts the snow during the day, and then keeps nighttime temperatures from falling below freezing. This causes the snow to continue to melt and run downhill into homes, roads and culverts.

Indeed, most homes that were damaged by floodwaters during the rapid snow melt floods were not even in the designated flood plain, but happened to be downhill from a large mass of melted snow.

The Helena Valley north of the city of Helena is a natural flood plain that collects flood waters because it is low and acts as a bathtub during floods. It is the site of an ancient lake, with high ground water and alluvial soil. All of the water that spills out into the valley eventually winds up in the lowest part of the valley, which is Lake Helena. The valley is the receptacle for three drainages, Ten Mile, Prickly Pear and Silver Creeks.

Ten Mile Creek, which runs through the West Helena Valley, is a perched stream. This results in any water leaving the channel running downhill through the West Valley, where there has been a considerable amount of development. The 500-year flood plain in the West Valley is very extensive because sheet flooding from Ten Mile Creek follows natural drainages and low-lying areas until it winds up in Lake Helena.

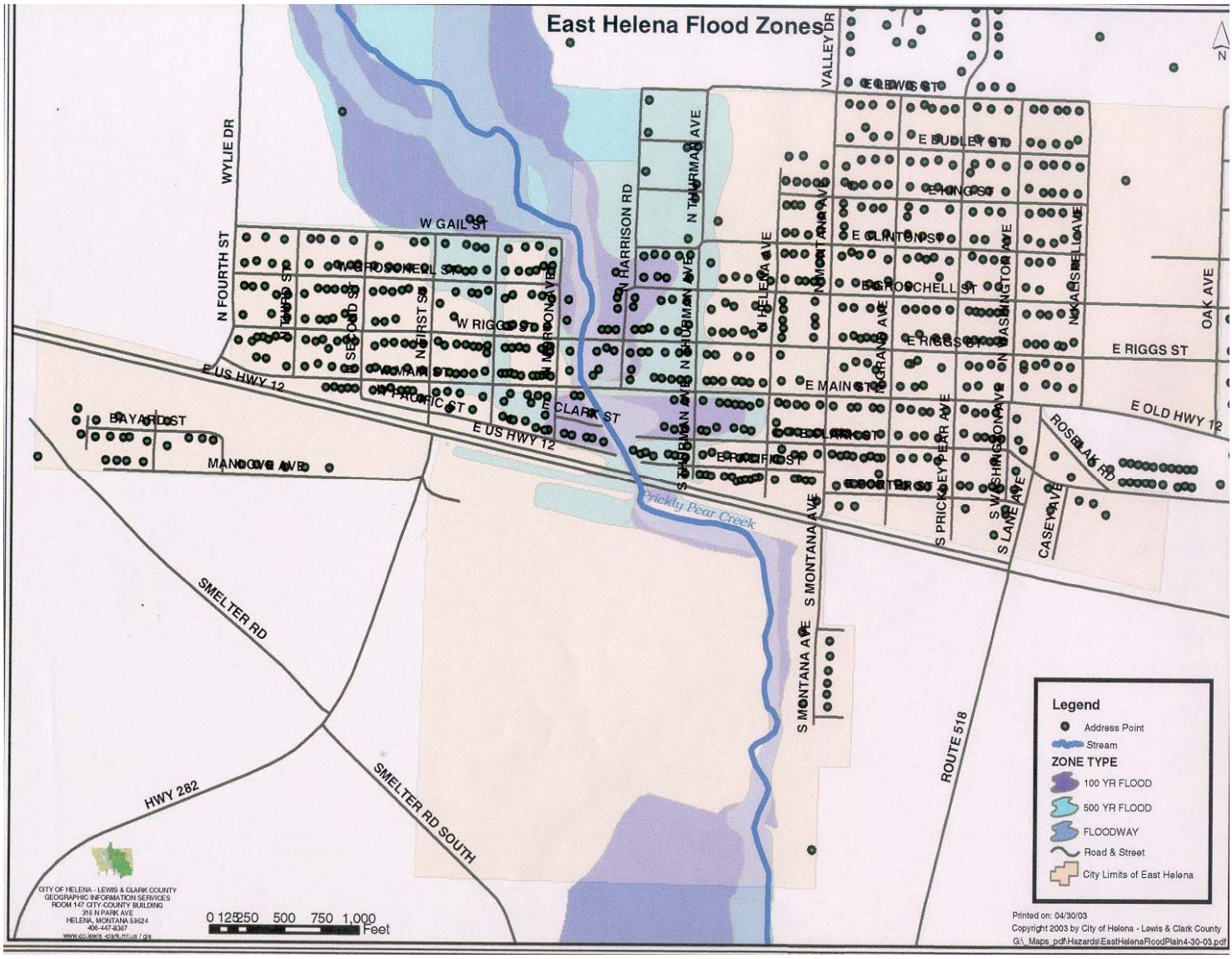
The Helena Valley flood plain map on the next page and the West Valley flood photo illustrate the extent of flooding throughout the valley as the water flows downhill toward Lake Helena.

Flooding has been the most common and repetitive of all disasters to hit the Helena Valley because of the extensive floodplain in the Valley and the low elevation of the area that collects flood waters as Ten Mile, Silver Creek and Prickly Pear Creeks overflow their banks.

1981 FLOOD IN THE WEST HELENA VALLEY

EAST HELENA FLOODING

East Helena flooded in 1908, 1975 and 1981. The city received significant structural damage during the 1908 event. Conversely, there was little damage in 1975 because of sandbagging operations. The 1981 200-year flood could not be stopped with sandbagging, and consequently caused structural damage to the homes in the flood plain.



NATIONAL FLOOD INSURANCE PROGRAM

The county enrolled in the National Flood Insurance Program with the adoption of a flood plain ordinance in March 1981. The mapped flood plains in the county are Ten Mile, Prickly Pear and Silver Creeks in the Helena Valley; Elk Creek in Augusta; the Blackfoot River in Lincoln; Trout Creek and Spokane Creek northeast of Helena, and the Missouri River from the Cascade County line to a few miles south of Craig.

Lewis and Clark County has a total of 34 Flood Insurance Rate Maps and Floodway and Flood Boundary maps. They are on-line under GIS, Maps On Line, and Hazards at the county home page, which is www.co.lewis-clark.mt.us.

The cities of Helena and East Helena are also enrolled in the National Flood Insurance Program, with flood plain ordinances and the regulation of their flood plains. There is one flood plain map for each city.

Lewis and Clark County has enrolled in the FEMA Community Rating System, which encourages jurisdictions to exceed minimum flood plain regulations through extra curricular activities, such as public outreach and education. Currently the county enjoys a CRS rating of 8, which means that flood insurance premiums within the county are discounted by ten per cent.

Lewis and Clark County revised its flood plain ordinance in June 2002. The flood plain maps of the Helena Valley were revised then, and new maps for the Silver, Trout and Spokane Creek flood plains were received from FEMA.

A total of 906 homes are located in the 100-year flood plains in Augusta, Lincoln, East Helena, Helena and the county. See the appendix for the flood plain maps of Augusta, Lincoln, Silver Creek and Helena. A table of homes and people residing in the 100-year and 500-year flood plains is on the next page.

PROBABILITY OF FUTURE FLOODING

The probability of future flooding is high, especially in the Helena Valley, because of the aforementioned bathtub effect and the increased development in the Valley. Flooding remains the most common disaster in the county, and especially in the Helena Valley. The increase of impervious surfaces also increases the prospect of flooding and drainage problems.

Other causes of flooding are roads, which act as dikes, and culverts that are too small or clogged with debris.

Prickly Pear Creek, which runs through East Helena, runs high each spring, and has the potential of running over its banks with this high run-off.

Elk Creek in Augusta and the Blackfoot River have not flooded with the regularity of the streams in the Helena Valley. Therefore, the probability of future flooding in these towns is less likely than flooding in the Helena Valley or East Helena.

COMMUNITY VULNERABILITY FROM FLOODS

As stated earlier, a total of 906 homes are in the flood plain, according to the data available from the county GIS office. Fortunately, the county has never experienced the life-threatening, dramatic events commonly seen on TV except for the valley floods of 1908 and 1981. The last recorded loss of life to a flood was in the 1908 event in the Helena Valley.

The population estimates are based on 2.3 persons per household.

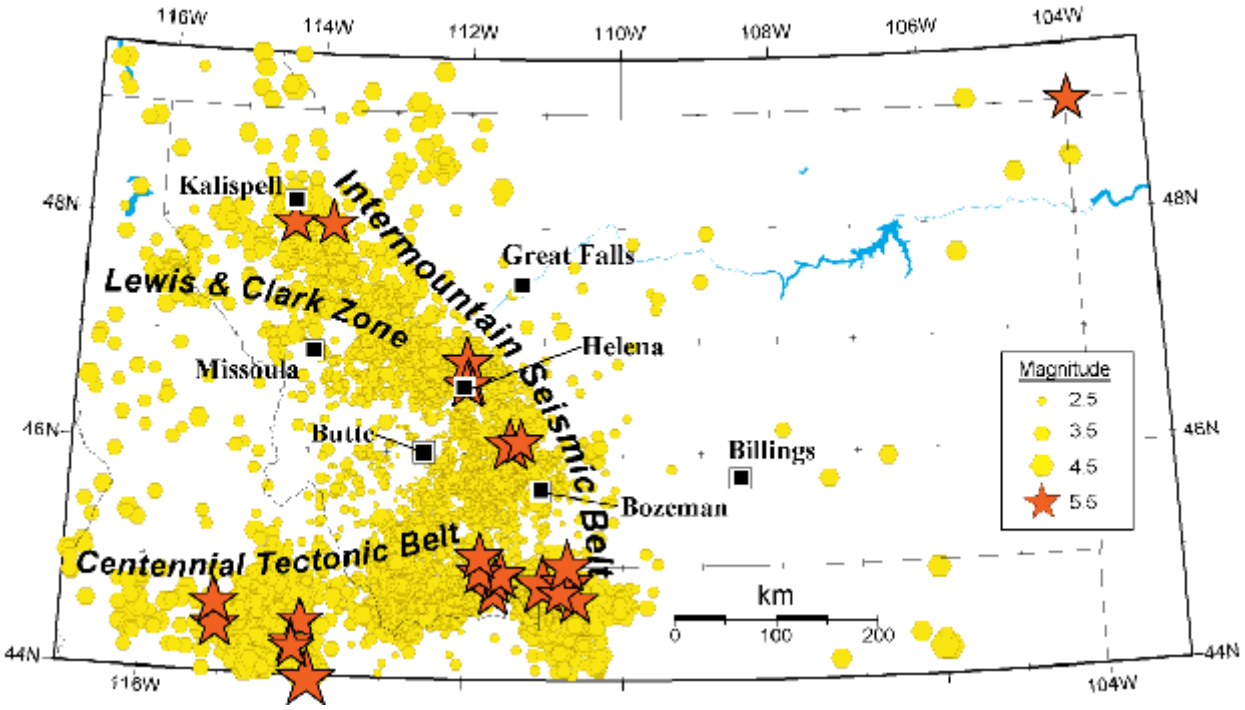
AREA	Flood Zone	Single-Family	Multi-Family	Commercial	Market Value	Number of People
Augusta	100 year	141			$2,702,719.00	336
	500 year	5			$343,812.00	12
Lincoln	100 year	74			$2,542,659.00	176
	500 year	6			$125,868.00	14
East Helena	100 year	53			$2,535,603.00	126
	500 year	19			$4,149,657.00	221
Helena	100 year	14			$449,947.00	33
	500 year	19			$1,350,942.00	45
	500 year		9		$494,064.00	54
	500 year			32	$50,696,141.00	
County	100 year	624			$22,601,449.00	1485
	500 year	771	9	32	$95,449,813.00	1889

Homes suffer from high ground water when basements flood, more so than from surface waters entering a structure. Residents can be cut off from their homes when approach roads are flooded, or when water surrounds a house and hinders entry.

Critical facilities are fortunately for the most part out of the flood plain. The only two schools in the county that receive floodwaters are Rossiter School in the West Valley and the Lincoln School in Lincoln. Floodwaters do not enter the schools, but accumulate in the parking lots, which are very low, and tend to pond for a period of days. The problem is worse in Lincoln, where the school operates a pump to remove the water. See the appendix for critical facilities maps for the county, Helena and East Helena.

2. EARTHQUAKE:

Western Montana is part of the Northern Intermountain Seismic Zone, and the western half of Lewis and Clark County is in Seismic Zone 3, which means that an earthquake could cause major damage. This zone includes Helena, East Helena and the Helena Valley, which has the major part of the county's population at about 50,160 for that area. Considering past seismicity and population concentration, Helena is considered to be the most vulnerable to an earthquake in the state, and it shares this high vulnerability with Bozeman.



The earliest Helena earthquake shook the city on May 22, 1869. Since then more than 1,000 earthquakes have been detected within 15 miles (24 km.) of Helena.

Three major earthquakes hit Helena in October 1935. On October 12 a 5.9 earthquake was recorded, then on October 18 at 10:10 p.m., a magnitude 6.3 earthquake occurred, with a major aftershock hitting the area on October 31 at 2:30 p.m. These earthquakes killed four men, caused over $4 million of property damage, and damaged to some degree 60 per cent of the buildings in the area. Shaking intensities of 8 on the Modified Mercalli Intensity Scale were reported for both earthquakes. This means that drivers had trouble steering and poorly built structures suffered severe damage.

There were over 1800 palpable tremors in the area before the last one shook up residents on April 30, 1936. For more information on the 1935 Helena earthquakes, go to the county home page at www.co.lewis-clark.mt.us, then to the public safety, DES, and earthquake links.

Over 500 people were displaced for a period of time because of damaged homes or the sheer fright of aftershocks that kept many from returning home. A tent city sprung up in the Helena Valley because many chose to live in tents for a while until the aftershocks subsided. And many others decided to stay with family and friends out of town.

The 1935 earthquakes were the most destructive earthquakes to hit Helena since it was founded immediately after the Civil War. Fortunately, the temblors that have shaken residents in later years have been minor, and barely palpable. The Montana Bureau of Mines and Geology seismograph system records about 800 earthquakes in Montana annually, most of which (90 per cent) are not felt on the surface. Many of these earthquakes occur in Lewis and Clark County, but are not reported by residents because they are not noticeable on the surface

DAMAGE MAP OF HELENA'S OCTOBER 1935 6.0 EARTHQUAKE
RED IS MAJOR DAMAGE, YELLOW IS MODERATE

PROBABILITY OF FUTURE EARTHQUAKES

Earthquake recurrence intervals for the Lewis and Clark County area have been calculated by Mike Stickney of the Montana Bureau of Mines and Geology. A magnitude 5 or greater earthquake is expected to occur once in a 32-year period; a magnitude 6 once in a 190-year period and a magnitude 7 once every 1112 years. These calculations are based on past seismic activity.

Numerous faults in the vicinity of Helena show evidence of large earthquakes (up to magnitude 7.5) during the recent geological past (see Montana Bureau of Mines and Geology Special Publication 114). Earthquakes are high impact, low probability disasters, which require effort and energy to plan for and to mitigate the damage that is expected when a major seismic event strikes.

COMMUNITY VULNERABILITY FROM EARTHQUAKES

There are numerous Un-reinforced Masonry (URM) buildings in and around Helena that would likely receive major damage in a large earthquake. Over 350 buildings in Helena have been built before 1900, and many are un-reinforced masonry, which have the least resistance to seismic force.

The city also has hundreds of buildings and homes that have high brick chimneys, that typically are the first to fall in an earthquake, because brittle mortar will crumble when the ground shakes. This will cause the bricks to fall through the roof, or worse, fall to the ground and kill or injure people below.

The liquefaction map shown in the earthquake section indicates that ground failure may occur in many areas of the Helena Valley. Liquefaction may occur when an earthquake strongly shakes loose granular (sandy) soils with a shallow water table. This phenomenon causes a temporary loss of soil strength, resulting in a loss of foundation support for large structures. Ground cracking and expulsion of large quantities of water, gravel, sand and mud characterize liquefied areas. The thick alluvial soils of the West Helena Valley will tend to amplify ground shaking during an earthquake.

Building contents are also subject to falling in an earthquake, which causes property damage, and possible injury and death to the occupants. Post-earthquake hazards can be significant, which would include fire, gas leaks, electrical outages, transportation disruption, and low or no water pressure.

C. ASSESSING COMMUNITY VULNERABILITY

FLOOD: Lewis and Clark County's vulnerability to flooding is illustrated by the five major flood plains in the county: Elk Creek in Augusta; the Blackfoot River in Lincoln, Prickly Pear

Creek in East Helena and the Helena Valley; and Silver and Ten Mile Creeks in the valley. The Augusta and Lincoln flood plain maps are in the appendix.

A total of 906 residences are in the 100-year flood plain for a total of $30,832,377.00 in value. There are 894 homes in the 500-year flood plain for a total value of $28,262,297. There are also 64 commercial buildings in the 500-year floodplain that are worth $14,614,595.

The infrastructure that is vulnerable to flood damage has proven to be roads, culverts and bridges, especially in the county. Floods will scour bridges until they wash away or are damaged. Culverts and roads are typically washed out by the fast moving water and need to be replaced in the recovery. Washed out county and approach roads make it difficult for residents to return home or for commuters to use their regular transportation routes.

As pointed out in the history of flooding portion of the plan, rapid snowmelt floods in the Helena Valley have become more numerous in recent years, and have exceeded the number of floods that occur in the spring. The valley has been hit with rapid snowmelt floods in 2003, 1996, 1985 and 1982. Conventional floods, caused by streams overrunning their banks, have occurred in 1981 and 1975.

Helena is high and dry, except for the floodplain coursing through town starting at the confluence of Grizzly and Oro Fino Gulches south of the city and running through West Main, along Last Chance Gulch. The 100-year floodplain becomes the 500-year on West Main, then runs north through downtown and under Lyndale Ave., north of the Great Northern Center. (See the Helena flood plain map in the appendix.)

The only essential service building in the East Helena floodplain is the fire hall at the intersection of Pacific and Morton Streets.

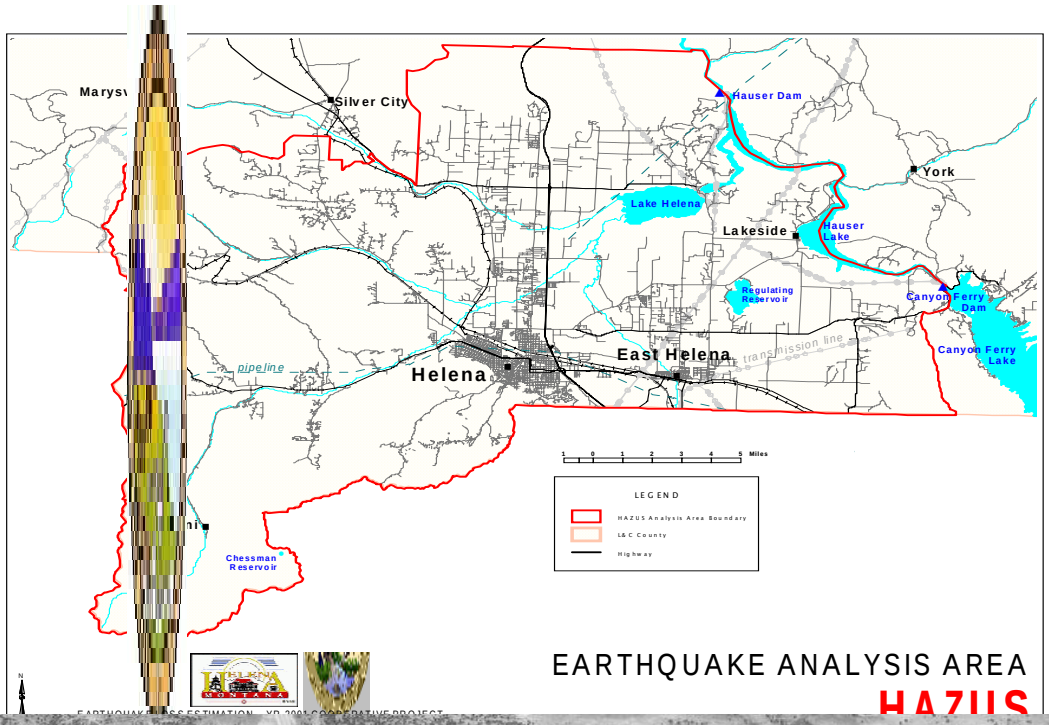
D. **ESTIMATING POTENTIAL LOSSES: FLOOD**

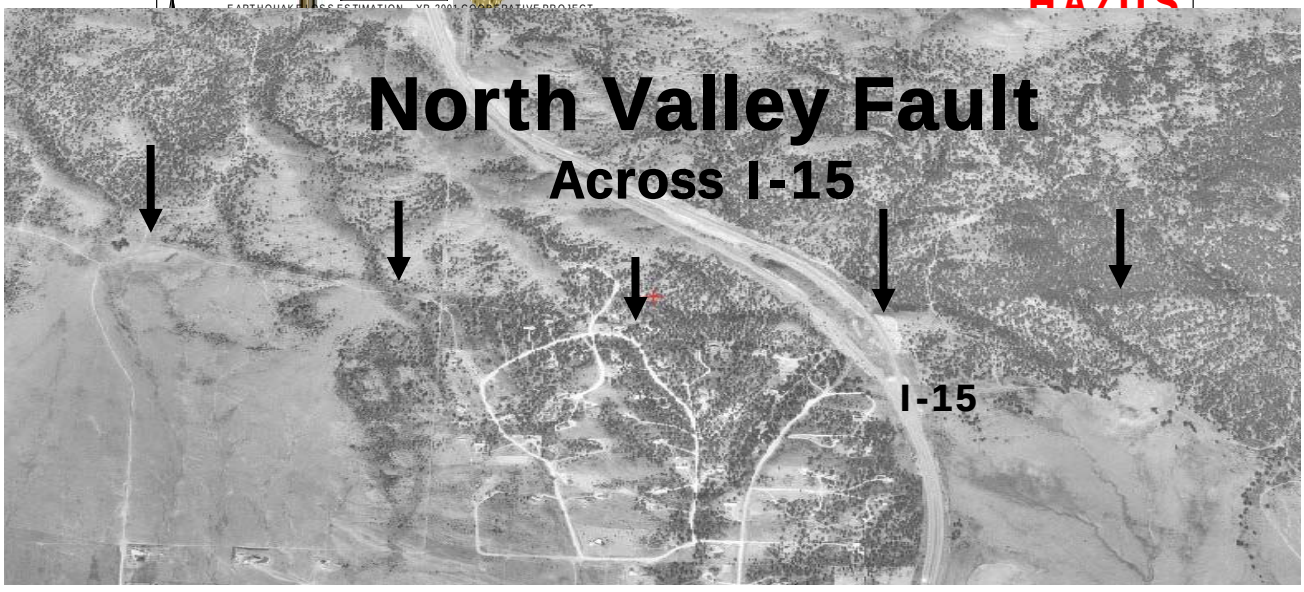
Based upon the history of flooding in Lewis and Clark County, it is difficult at best to estimate losses in floods. Losses are dependent upon the type of flooding and the magnitude, i.e. 100 or 500-year, or somewhere in between. A repeat of the 200-year event in the Helena Valley, which caused about $660,00 worth of public infrastructure damage, would probably cost over $2 million today. This is based on inflation and the development that has occurred in the floodplains over the past 20 years.

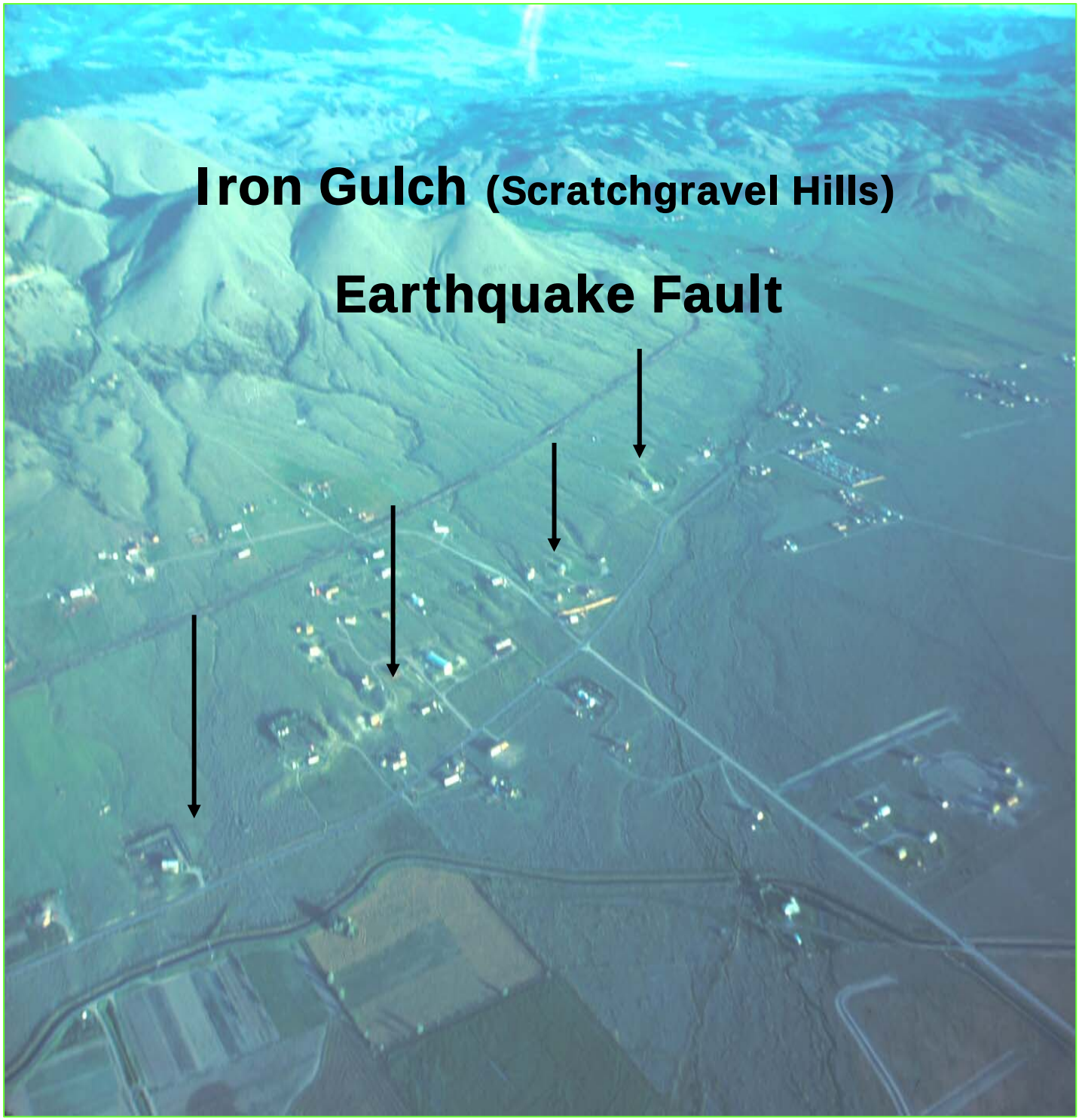
E. EARTHQUAKE:

Earthquake loss estimates for the Helena area are based upon the Hazards United States (HAZUS) Earthquake study completed in 2002. Under Project Impact, an Economic Development Administration grant paid for a contractor to determine losses for the Helena area for the next major earthquake by using HAZUS.

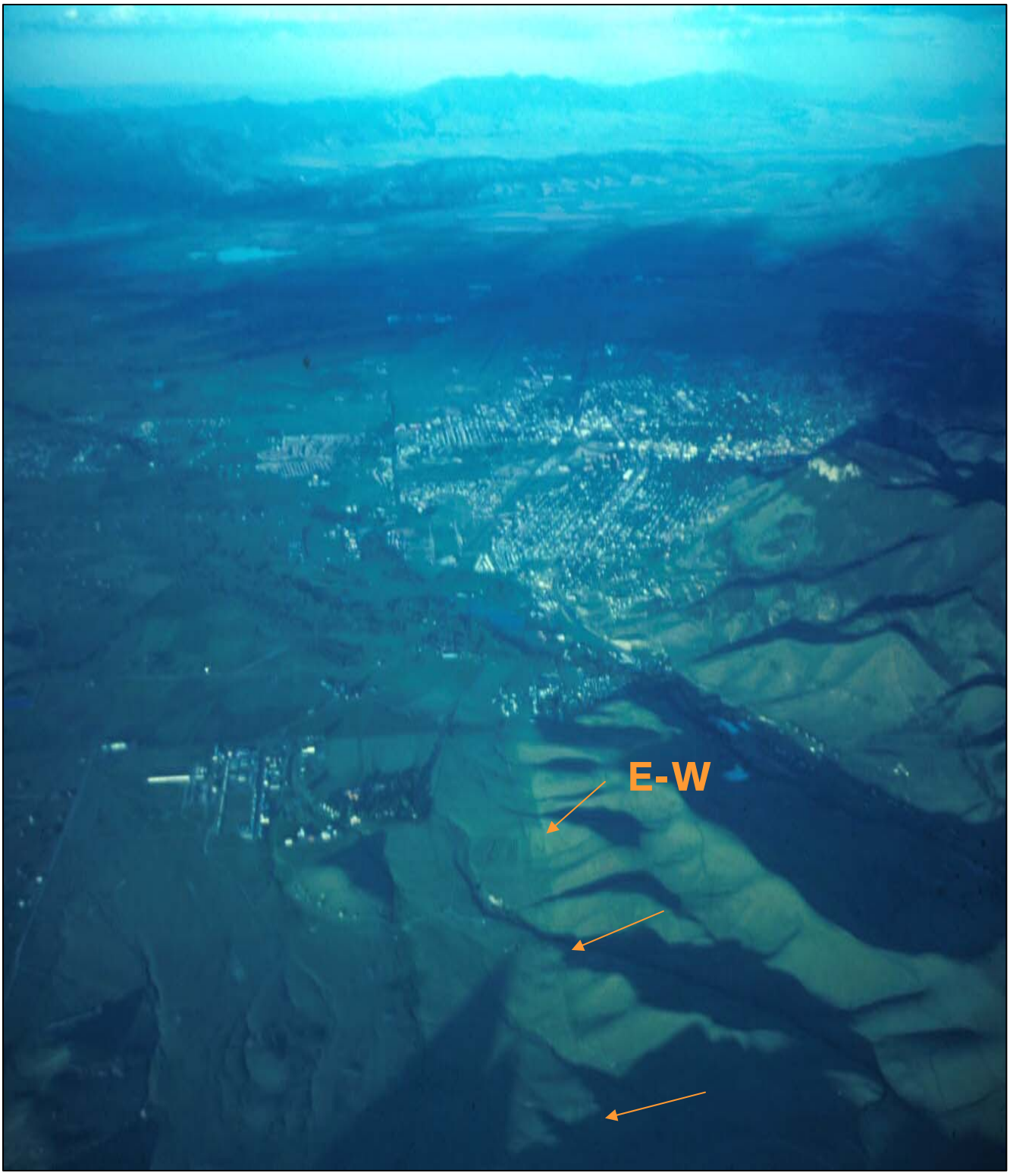
The HAZUS committee determined that since the bulk of the county's population and infrastructure were in Helena, East Helena and the Helena Valley, the study would focus on this area, which is in Seismic Zone 3. The eastern half of the county, which includes Augusta and Wolf Creek, are in a lower seismic zone (2), which equates to the potential of moderate damage from an earthquake. Seismic Zone 3 means major damage could occur in an earthquake.






Iron Gulch (Scratchgravel Hills)
Earthquake Fault

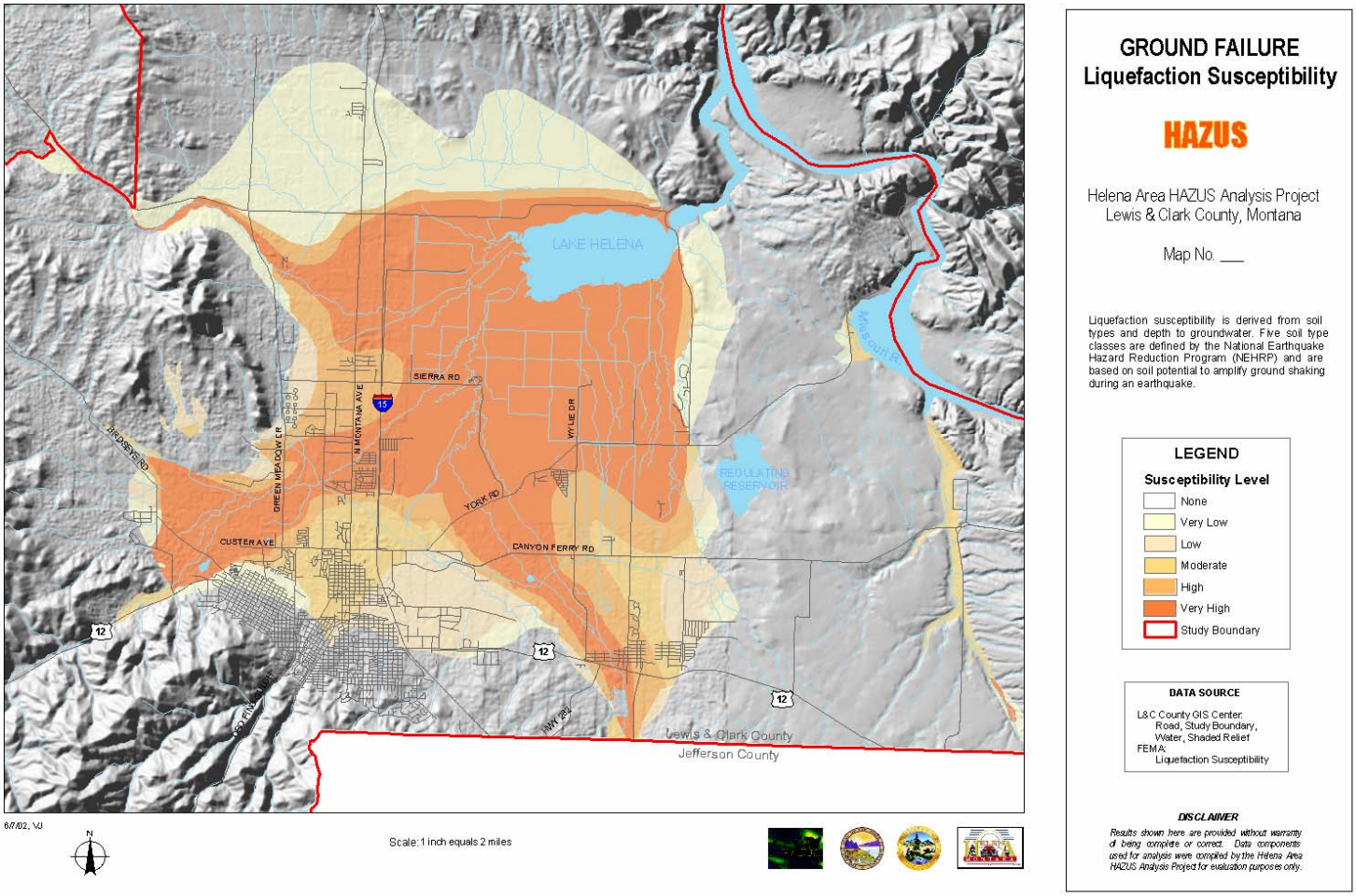
EARTHQUAKE FAULT WEST OF HELENA AND SOUTH OF FORT HARRISON



It is estimated that a repeat of the 1935 magnitude 6.3 Helena earthquake would damage at least 4,000 buildings. If the event was at a 7.2 magnitude, a minimum of 5,000 buildings would be damaged to some degree, with 650 residences receiving extensive damage. The potential total damage is estimated at $400 million.

If a magnitude 7.2 hits at 5 p. m. on a workday, it is estimated that 12 people would be killed and about 250 injured. Most of the injuries are expected in the downtown area of Helena, because of the dense population during a weekday and the number of older buildings.

The Liquefaction Potential Map below shows areas of high liquefaction susceptibility, which causes ground failure due to high ground water and unconsolidated soil. Most of the city of Helena has low to moderate susceptibility to liquefaction. However, much of the West Helena Valley is highly susceptible, and the potential for damage to water pipes, septic systems and buried infrastructure is high.



The map identifies the high liquefaction susceptibility zones west and south of Lake Helena. Damage in these areas from a major earthquake (magnitude 6 or above) will be greater than in parts of the county that are less prone to liquefaction. Transportation arterials and bridges are likely to be damaged in these areas, as well as buildings.

Most homes in the Helena Valley have been built within the last 25 years, and are either one story frame or mobile. Homes that are tied to a permanent foundation will suffer less damage than those that are not fastened down, and may shake off of the foundation during an earthquake.

Helena has older homes, as noted above, but most of the soil is bedrock, which does not amplify ground motion as do alluvial soils with a high water table. Many of the buildings in Helena survived the 1935 earthquakes, but some may have been damaged structurally, without any visible signs of the damage.

Debris removal following an earthquake is expected to be a major problem, and led to writing the Lewis and Clark County, Helena and East Helena Debris Management Plan in 1999. A magnitude 7.2 earthquake is expected to generate 80,000 tons of brick and wood debris, and a 6.0 would generate 31,000 tons of similar debris. Another 50,000 and 157,000 tons of reinforced concrete and steel would be the debris generated by respective magnitude 6.0 and 7.2 earthquakes.

Public shelter requirements are estimated at 140 displaced households for a 6.0 event, and up to 900 households for a 7.2 event.

SCHOOLS:

The Helena School District has surveyed two high schools, two middle schools and 11 elementary schools to determine seismic risk during a major earthquake.
The results of this study are in the appendix.

HAZUS estimates that a 7.2 earthquake could cause moderate damage to 80 per cent of the schools in the Helena Valley, with two schools suffering major damage. Injuries and fatalities to students and staff are dependent upon the day and time that the earthquake strikes.

TRANSPORTATION ROUTES:

Interstate 15 cuts north and south through the county and Helena. U.S. Highway 12 runs through Helena and East Helena and is the primary east-west road in the county. There are also over 80 miles of primary and secondary state and county roads in the HAZUS study area. There are 64 bridges in the study area, plus the Helena Regional Airport and Montana Rail Link, which bisects Helena and runs east and west through the county.

The transportation inventory in this study area is more than $2 billion. The airport is valued at $523 million, MRL at $153 million and highways and bridges account for another $1.3 billion.

UTILITIES:

The Yellowstone Pipeline winds its way through the eastern and western half of the county on its way up to Great Falls and Missoula. This line is ten inches in diameter and carries petroleum products. The line also runs underground through Helena.

Northwest Corporation distributes gas and electricity through the Helena area. Loss estimates are not available for these utilities because of the proprietary nature of the industry. Therefore, they were not available for the HAZUS report.

There are 55 communication facilities in the study area, used for wire and wireless telephone and data transmission. Distribution lines were not available for the study.

DAMS:

There are two dams in the HAZUS study area: the Canyon Ferry Dam on the Missouri River east of Helena, and the Helena Valley Irrigation Reservoir, both owned by the Bureau of Reclamation.

The Canyon Ferry Dam is concrete and was designed for Seismic Zone Three (probable major damage in an earthquake) when it was built in the 1950's. The Helena Valley Irrigation Reservoir is an earthen dam that was reinforced about 30 years ago to strengthen it against failure when three faults were discovered in the immediate area of the dam. About 2000 people live in the inundation area.

Plans have been written to warn and evacuate the population at risk from the failure of these dams.

3. WILDFIRE RISK MITIGATION

Wildfire hazard mitigation is a huge task in Lewis & Clark County. The wildfire mitigation program that was initiated through the county involvement with FEMA's PROJECT IMPACT spurred the Tri-County Fire Working group into a growing presence in its prevention and mitigation activities. The county has the wildland fuel hazard risk rated through a mapping assessment that was completed as a PROJECT IMPACT project. The map was expanded utilizing GIS technology to portray the number of homes and residents located in the "High" and in the "High to Severe" risk categories. In Lewis & Clark County there are 2,358 homes, representing 7,782 residents (2000 census) and a 2002 estimate of value of $145 Million found within these two risk categories. These numbers increase with each home and subdivision that occurs in the wildland/urban interface. This Fuel Hazard Mapping project is a continuing one and most importantly provides the target areas for our aggressive fuel hazard reduction projects. The fuel hazard map is found in the center of this plan.

Lewis & Clark County has the following as its wildland fuel mitigation goals:

A. Firefighter and public safety as it relates to wildland fire within the county.

B. Encourage risk reduction to homes and private property through expanded outreach and education about wildfire prevention through the use of programs such as Firewise, presence at public forums, presentations to service groups, media presentations, etc. We emphasize to homeowners that they bear much of the responsibility for improving the defensibility of homes in the interface, but understand they may lack the knowledge and information regarding what needs to be done and how to do it. The county can provide the leadership needed to coordinate, develop and distribute educational materials and partnering between homeowners, communities, local fire jurisdiction, contractors, insurance companies and government agencies. Our experience has proven this to be the successful approach to the problem.

C. Fuel reduction projects and vegetation treatments have been identified as a means of mitigating wildfire hazards. These are projects that remove or modify fuels in and/or adjacent to Wildland Urban Interface (WUI) development. Effective fuels mitigation treatments can be implemented across jurisdictional boundaries, on adjoining private lands, or within the respective communities. Partnerships with landowners, government agencies, and contractors are facilitated by the county for the coordination and collaboration required to make these projects work. Projects of this type include fuel breaks, thinning, pruning, roadside fuel reduction, landscape modifications, etc. The overall purpose is to modify or break up the fuels in order to mitigate catastrophic fire and its threat to public and firefighter safety and damage to property.

D. Prevent future large, catastrophic wildfires from threatening our local communities by carrying out appropriate treatments (such as prescribed burning or thinning) to restore and rehabilitate forest and grassland health in and adjacent to the WUI. Such treatments have reduced the severity of wildfires, and may have additional desirable outcomes, such as providing sustainable environmental, social and economic benefits. Projects require planning, consultation, design, and sometimes contracting. Certainly advocacy for these types of projects is seen as necessary by our county program. Evaluating effectiveness of treatments is necessary to ensure the dollars spent to achieve the fuel hazard reduction are wisely employed.

E. Creating conditions in and around individual structures that will limit the transmission of fire from wildland to structures, and from structures to wildland is basic to reducing the fire hazard in the Interface. This is a responsibility of homeowners and communities. The county and local fire jurisdictions can facilitate these actions through safety inspections; demonstration projects; training and education of homeowners, officials and service personnel; maintaining fire safe groups such as our Tri-County Fire Working Group; and coordination of projects, services, and supplies.

Risk Assessment

Wildland fire is no stranger to Lewis & Clark County. Ignition sources include all of those normally found in the west. Human causes, both accidental and arson, and natural occurrences of lightning are common. The Helena Interagency Dispatch Center reports a total of 183 combined lightning and human caused fire starts for the Department of Natural Resources (DNRC) Central Land Office and Helena National Forest for the 2003 fire season. This number does not include false alarm calls. Lightning caused 133 of these fire starts.

Wildland fire from natural causes is of course dependent on weather conditions for each fire season. It is also dependent on the available fuel and the conditions of that fuel if the ignition source is presented. Since we know we cannot do anything about the weather we are left with modifications of the available fuel and the condition of that fuel for mitigation actions. Human caused fires present a problem of prevention education, mitigation of the fuel hazard on privately owned lands, mitigation of fuels in concentration areas such as recreational sites, and education on construction practices and the characteristics of structures in the WUI.

The risk assessment on individual sites includes the physical features of vegetation, slope, and aspect of the land or building site. We also include the construction features of the structures, the conditions of ingress and egress, rural addressing compliance, bridge features, likely fire approach routes, history of fire in the area, fire protection availability, and utility location. The evaluation is done at the homeowner's request and is the first step toward the development of a mitigation project to correct those items where improvement is recommended. Subdivision risk assessment utilizes the DNRC "*Fire Risk Rating for Existing and Planned Wildland Residential Interface Developments in Montana*", dated March 1993. The Fuel Hazard Risk mapping project provides the "targets" for fuel hazard reduction projects from individual properties or subdivisions.

Community risk assessments have been undertaken by Wolf Creek, with the local volunteer fire department providing the lead. A similar plan is in the development stage for the community of Lincoln. These plans utilize the same criteria for the risk assessment as used countywide and include fire progression maps, structures at risk, suppression pre-planning, and population protection plans. They also provide a more local prioritization for fuel hazard reduction projects in their communities.

The assessment, using the fuel hazard-mapping project for the basis, has rated 728, 109 acres within Lewis & Clark County alone. Of that rated acreage, 50 per cent is in either the "High" or "High to Severe" risk category. The table below shows the number of acres in each of the four categories.

	Fuel Hazard Rating	Acres
Low	A	264,893.17
Medium	B	98,891.71
High Risk	C	243,291.94
High to Severe	X	121,031.86
	Total Area Rated	728,109

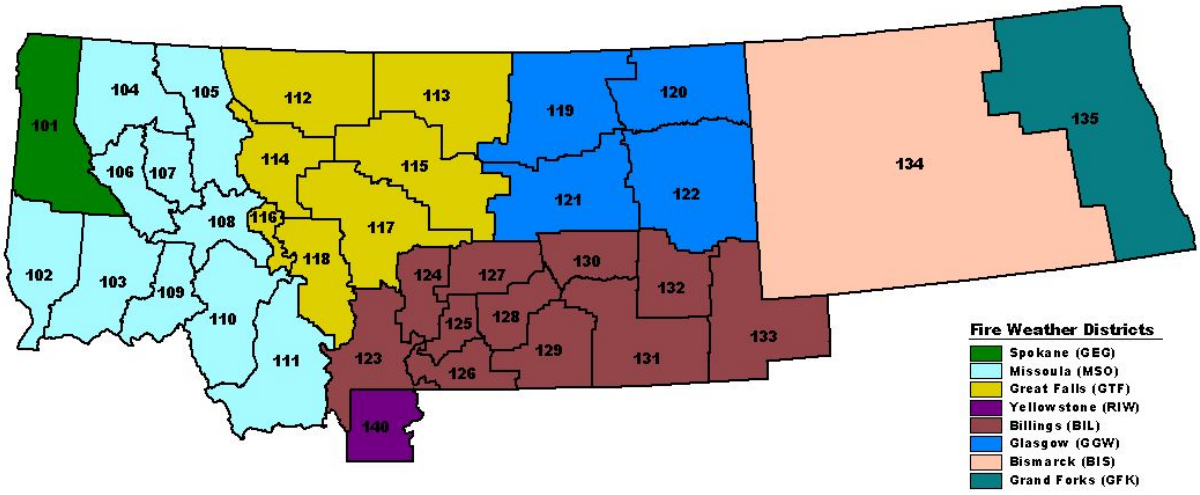
This situation, which presents the mixture necessary for an intense, potentially catastrophic wildfire, is heightened by the number of homes and residents that are also found within these risk categories (see numbers above). Wildland fire in the fuel types found in Lewis & Clark County may exhibit either ground fire or crown fire behavior. It is the intent of our mitigation projects to keep a fire on the ground and of low intensity to minimize resource damage and property loss. Low intensity fires are also less costly in fire suppression resources commitment and more easily contained upon initial attack.

Fire History

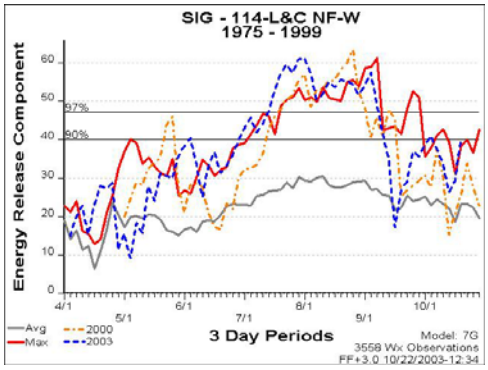
Recent large fires in Lewis & Clark County include: the Jimtown Fire (2003) 1,000 acres, human caused; Lincoln Complex (2003) 37,707 acres; Moose-Wasson Fire (2003) 1,802 acres; Box Canyon Fire (2003) 161 acres, human caused; Buck Snort Fire (2000) 14,500 acres human caused; Cave Gulch Fire (2000) 29,200 acres, human caused; Little Hellgate Fire (1999) 200 acres, human caused; Hauser Dam Fire (1999) 220 acres, campfire caused; Willow Creek Fire (1997) 2,000 acres, human caused; Lower Coxcy Fire (1996), human caused; Valley #1 Fire (1994) 50 acres, fireworks caused; Dearborn River (1992) 1,300 acres, human caused; Beartooth Fire (1990) 33,000 acres, human caused. All of these recent fires resulted in the destruction of property, evacuations and threatened homes.

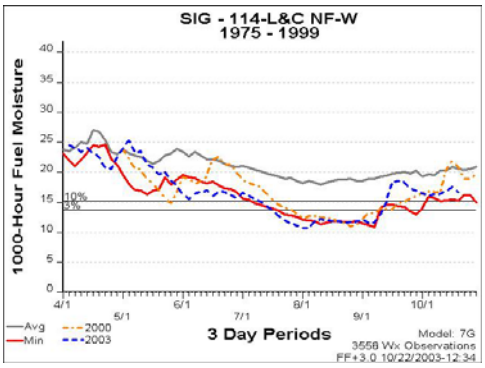
Weather

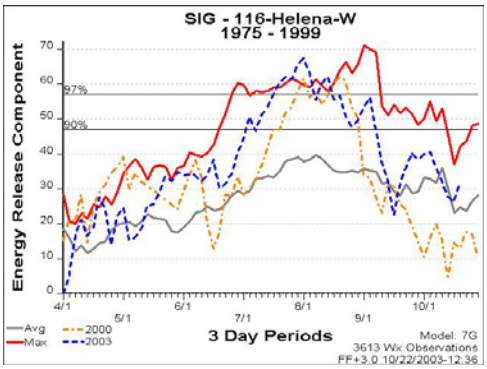
The county is located in the designated fire weather zones 114, 116, and 118. These zones are typified by frequent high wind events, thunderstorms, and low relative humidity.
BLM lightning strike data shows 13,672 lightning strikes for a 90-day period during the 2003 fire season within this area of Lewis & Clark County.

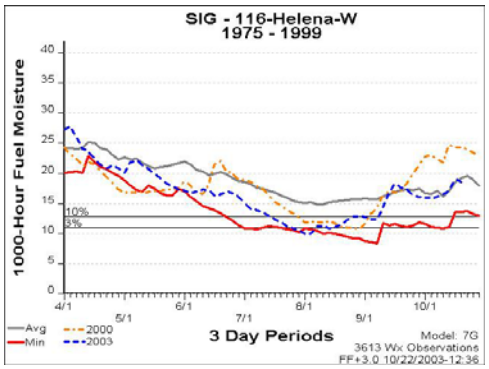


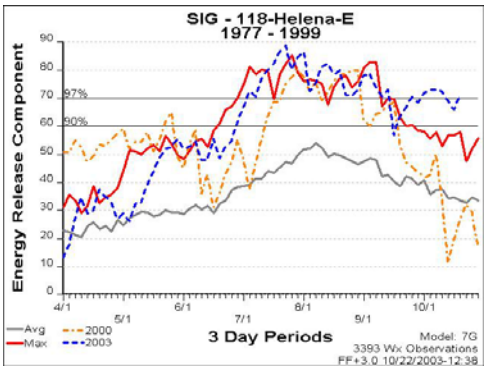
The 2003 Energy Release Component and 1,000 hour fuel moisture indications for these three fire weather zones have the following graphic information. The data is provided from the Northern Rockies Coordination Group, Missoula, MT.

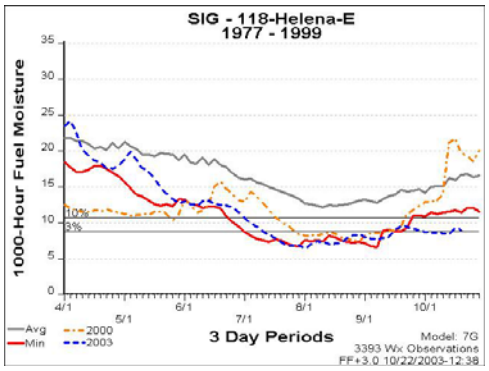












The historic weather pattern indicated in these graphs shows that every portion of Lewis & Clark County is subjected to very high to extreme burning conditions throughout the traditional fire season. The most current data reflects the impact of several years of drought on the severity and length of the fire season itself.

City of Helena

The City of Helena is a partner with the county in wildfire mitigation. The city has had management responsibility for the Mount Helena area since 1905. It now holds approximately 1,300 acres of Open Space lands. These lands are by definition within the WUI and the city is embarking on an active management plan for these lands. The plan includes vegetation management projects to reduce the fuel hazard. Recreational trailheads and trail patterns will be treated in addition to larger tracts of timberland to reduce the potential for human fire starts. A prescribed fire burn plan has been adopted and implemented for mitigation treatment areas on MT Helena for purposes of slash disposal. This is a cooperative endeavor with the Helena Ranger District and the City of Helena Fire Department.

Of concern for the city and the county is the municipal watershed located south and west of Helena in the Rimini area. The Ten Mile Creek Watershed Protection Group has adopted fuel hazard reduction as one of their goals. This area is not only a main source of water for the city; it is also a portion of the South Hills that is seeing many home developments in the interface area. Wildland fire in this area would have a severe negative impact on the city water quality and quantity, and of course it is a major threat to residential developments.

City of Helena Fire Tower with Mt Helena in Background

Mitigation Projects

Lewis & Clark County and its partners have been very active in the development and completion of wildland fuel hazard reduction projects. Sources of funding for such projects have been the National Fire Plan (USFS, BLM), Western Wildland Urban Interface Grant Program (DNRC), Hazard Mitigation Grant Program (DES), and PROJECT IMPACT (FEMA).

The above photos show the proximity of the City of Helena residential sections to the Open Space lands within the city limits and a fuel reduction project on city land in partnership with the Tri-County Fire Working Group. The bottom right photo is a completed firebreak boundary on city land.

The profile of projects that have been completed or contemplated has grown rapidly in the recent years. Initially the focus was on the creation of individual defensible space projects around single residential units. Since 2001 private contractors have treated several hundred home sites through the grant/match program. As the program gained momentum, and the money became available, fuel hazard reduction in neighborhoods became a reality.

Projects were undertaken that could take advantage of contiguous ownerships of small tracts within a subdivision, utilize existing road networks for fuel breaks projects, and reduce fuels in common areas. The next step is to seek out larger tracts of private forested land where contiguity with either USFS or BLM lands exists so that collaborative projects with those agencies may be contemplated and completed. The Helena National Forest is moving forward in the County with fuel hazard reduction on federally managed land within the WUI in the following areas: Bull Sweats 1300 acres of thinning; Clancy/Unionville 3,000 acres fuel mitigation treatment; American Bar subdivision 500 acres fuel mitigation treatment; Priest Pass subdivision 700 acres fuel mitigation treatment; Beaver/Soup 1,500 acres fuel mitigation treatment.

People may apply for a risk assessment/grant/project by completing the application below.

Individual Home Risk Assessment

Residents of Lewis & Clark County may obtain an evaluation of the wildland fire risk associated with their home without any cost to them. The home itself plus the outlying natural and man-made features of the site are included in the evaluation. Response agency needs, such as rural addressing and water supply, are also noted. If there is a fuel hazard risk identified, and if the homeowner desires to enter into an agreement to mitigate that risk, an application is submitted to the Tri-County Fire Working Group to address that risk.

If there is funding available at the time, a plan has been developed (see the worksheet below) that outlines the responsibilities of all parties involved and the work to be done. If the homeowner wishes, a contractor that has already been through the Group's qualification process will be engaged to implement the plan and cost share funding is provided. Homeowners are free to do

the work on their own. Mitigation of building characteristics or the needs of a response agency are not included in the wildland fuel hazard reduction project for cost sharing.


These pictures are representative of the type of individual defensible space projects being done.


A simple fuel break such as this might adequately address the individual property risk.

Photographs of various fuel modification projects completed, and the 2003 fire season, taken by Patrick McKelvey, Lewis and Clark County Office of Prevention and Mitigation.

Individuals may apply for a risk assessment/grant/project by completing the 1 page form below.

PROJECT APPLICATION

Tri-County Fire Working Group
Application for Assistance with Fuel Modification Project
Creation of Disaster Resistant Landscape

I understand the maximum amount available per project is $1,125.00.

The grant amount awarded will be based on a 75%/25% basis.
Example: Project amount= $1,500 = $1,125 grant money + $375 grantee match.

Grantee match may be made by either cash or in-kind contribution, or a combination of both. Grantee labor value will be calculated at the rate of $10 per hour.
All landowner planned labor or cost contribution must be approved by Tri-County FWG in advance.
Work on this Project must be completed within 6 months of Project approval.

Landowner Responsibility:

1. Meet with contractor or inspector to complete the Home Evaluation Form.
2. Complete this application form and submit it to:

   Tri-County Fire Working Group
   Pat McKelvey
   221 Breckenridge
   Helena, MT 59601
3. Maintain project work timesheet for contributions toward match amount.
4. Insure the completion of project work as described
5. Insure debris/slash clean up is accomplished by the agreed method.

   A. Burn B. Chipping C. Removal from property
6. Notify Tri-County Fire Working Group upon Project completion.
7. Agree to maintain this fuel modification for a minimum of 10 years or until I no longer own this property.

Reimbursement will be made by Tri-County Fire Working Group upon project completion and inspection approval.

Application information:

Name: Telephone number:
Address: Physical address of Property if different than mailing:

Subdivision: Name and Lot #
E-mail address?:
City: County:

Date submitted: Review Date:

Signature of Applicant Signature of Reviewer

Applications received prior to the last business day of each month will be considered by the selection committee for the next month approval.

Once an application has been acted on for a possible defensible space project, they are prioritized using the following matrix.

Defensible Space Grant Application
Application Score Matrix

Applicant name: _____

Property address: _____

_____

_____

			Points given	Points Possible
Fuel Model:				
Risk Assessment Level:		X		6
		C		4
		B		3
		A		2
Project contiguous with another project:				5
	Public ?:			
	Private ?:			
Primary Residence on Property:				10
Number of people who reside on property:				
Size of Ownership:				
Size of area treated:				
		Score:		21

Form for grant application scoring use by review committee.

Based upon the assessment and the determination that the hazard is present, a preliminary defensible space plan is designed with the homeowner. The following form is used to make that determination and the basis for the mitigation planning. It assigns the responsibility either to the owner or the contractor for each item checked. This also is the basis for determining the project cost and match requirement.

A project of the
Tri-County Fire Working Group in cooperation
with Montana Dept. of Natural Resources & Conservation,
your local Fire District, funded by USDA-Forest Service or BLM.
Phone 447-8225 for Lewis & Clark County Project Manager

Defensible Space Plan

Name:_____ Date:_____ Home P_____

Address:_____ Work Phone:_____ Cell Phone:_____

City:_____ County:_____ Zip:_____

Person Completing Plan:_____ Number of Homes:_____

Agency:_____ Phone:_____ **Fire District:**_____

Slope	**Aspect**	**Contractor**	**Owner**	**Recommendations/Comments**
Fuel Modification				
Flammable veg. Clearance -30'				
Flammable veg. Clearance -100'-150'				
Thin and Prune Zone				
Hazard tree removal				
Firewood removal (within one month)				Required to prevent insect infestation
Debris Disposal- **CHIP** **Burn**				
Addressing				
Posted/Visible/Readable				
Posted at Intersections				
Road/Driveway Access				
Accessible to Fire Equipment				
Room to Pass Other Vehicle				
Turn Around at Home				
Adequate Bridge at Water Crossing				
Alternate Escape Route				
Building Characteristics				
Fire Resistant Roofing				
Decks Protected				
Adequate Screening				
Chimney Spark Arrestor				
Firewood Storage Away From Struct.				
Other Considerations				
Roof Clear of Debris				
Ongoing Cleanup Program				
Use of Fire Resistant Plants				
LPG Tank Clearance				
Notify Owner Prior to Work		**X**		

This work is tentatively scheduled to begin on_____2004. Work completed on_____
This plan and the above items checked "**Contractor"** is funded by Forest Service 2002 Western Wildland Urban Interface Grant and subject to the funding thereof. The work checked "**Homeowner"** is at the homeowner expense. IF the landowner is seeking to apply any labor or costs as a project match it must be preapproved by Tri-County FWG. I hereby authorize the above work to be accomplished on my property and allow the contractors to enter onto my property for the purpose of conducting said work. I will maintain the fuel modification for a minimum of 10 years or until I sell the property, whichever is sooner. **Signature**_____**Date:**_____

TRI-COUNTY FIRE WORKING GROUP DOES NOT MAKE ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTIES OR FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT WILL TRI-COUNTY FIRE WORKING GROUP, OR ITS AGENTS BE LIABLE TO YOU OR ANY OTHER PERSON OR ENTITY FOR ANY INCIDENTAL OR INDIRECT DAMAGES, SPECIAL, OR CONSEQUENTIAL DAMAGES WHATSOEVER, ARISING OUT OF THE SERVICES PROVIDED HEREUNDER, EVEN IF THEY ARE FORESEEABLE OR YOU HAVE BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

Project Guidelines

Fuel Modification Guidelines

General:

1. Thinning and Pruning specifications apply to native conifers only.
2. Hardwoods will not be removed unless flagged.
3. Brush will not be removed unless specified in the plan.
4. Islands of non-treatment will be flagged (left at homeowners desire)
5. Flagging colors:
    A. Pink, Red and White Stripe, Red and Black Stripe indicate the boundary and the zone boundaries (if required)
    B. Blue indicates leave trees.
    C. White indicates mandatory removal.

Contractors need to be able to follow the flagging even if it looks wrong, the homeowner may have requested it. If it looks totally wrong contact the plan writer for clarification.

Large trees next to house:

These will generally not be removed with grant funding. They may be recommended for removal on the plan, but only at homeowner expense.

Thinning:

1. May be specified by spacing. Meaning, uniform stand normally younger "leave largest vigorous tree at 20 foot spacing.
2. May be specified by diameter. All trees over "X" diameter left unless flagged with white ribbon. Trees under "X" diameter space out "Y" distance between live crown.
3. May be specified by flagging. See above.
4. Default spacing. If not otherwise specified "X" feet between live crowns.
5. Stump height. Below lowest green branch?
    Diameter over 6" a maximum height of 6"with flat cut?
    Diameter under 6" a maximum height of 2" with flat cut?

Pruning:

1. Trees over 15 feet tall:
    A. Specified by distance between ground and live vegetation. Eight feet unless otherwise specified in plan.
    B. Along roadways and driveways may need a minimum of 13'6" to allow for emergency vehicle access.
2. Trees under 15 feet tall:
    A. Prune to 1/3 the live height with varying heights so as not to create a "plantation" appearance.

Debris disposal:

1. Either chip or burn will be specified in the plan. Specific details need to be written into the plan. If burn is circled then the homeowner and contractor need to determine the responsibility.

Firewood to be utilized:

1. If the homeowner wants firewood material the contractor need only prepare the cut material into lengths of 10 feet. Groove the bole length wise to allow for drying. Further cutting and removal will be the responsibility of the homeowner.
2. If some other program wants the firewood and the homeowner agrees, then it is the responsibility of the gaining program to remove the firewood with the same preparation guidelines to the contractor as above.

Sample prescription written with the homeowner's permission.

Project Goals

Create defensible space and disaster resistant landscaping around and adjacent to homes in the wildland urban interface areas.

Improve the vigor of the forest areas so it can better withstand future insect outbreaks and resource health.

Reduce the risk of damaging fires.

Maintain wildlife habitat and aesthetic values.

Prescription

The prescription is a combination of thinning, pruning, debris removal, and leaving untreated patches of brush and reproduction to provide wildlife habitat.

Untreated Islands will vary in size (most about 0.1 acre) and location. They will be comprised of reproduction and brush currently there and will be left undisturbed.
More islands can be left in larger treatment areas, fewer in narrow or small project areas; none should be left directly adjacent to homes.

Thinning of trees 8" DBH and larger will be done on those that have weakened or low vigor. This includes trees with broken tops, or closer together than 5'. Where larger trees are "clumped", but with adequate opening around them, only the broken top trees or severe low vigor trees will be removed, unless requested for aesthetic purposes. Trees smaller that 8" DBH and reproduction will be spaced from crown to crown at 5 – 10 feet, with those designated as leave trees being the most vigorous trees. Where reproduction is accumulating as ladder fuels it will be removed or treated as islands (see above) with landowner concurrence.

Pruning on larger trees will be minimal. Dead limbs will be left unless they are thick all the way to the ground, in which case the pruning height will be a minimum of 8 feet. On larger trees with green limbs the average pruning height will be a minimum of 8 feet. Reproduction green limbs will be pruned not to exceed 1/3 the height of the tree or 8 feet. Pruning height may vary to avoid the creation of a "lollipop" look with everything being the same.

Dead woody material on the ground and less than 4" in diameter, will be lopped (limbs removed) to lie on the ground and facilitate decomposition. Dead material larger than 4" will be evaluated for firewood suitability. Burnable wood will be removed as firewood (if desired). If not suitable, it will be lopped and left for decomposition. Standing dead trees will normally be left standing for bird habitat. Some may be removed to improve aesthetics and this is discretionary with the landowner.

Brush removal will be discretionary and plan specific. Distance from access roadways, driveways and structures will be the consideration and if left will be treated as islands (see above).

Debris reduction and/or removal will involve chipping and scattering of limbs on site where possible and desired. Mulch will be made available to landowner if desired, or removed from the site when required. If firewood is a desirable by product, it will be removed from the site, or safe on site storage will be accomplished.

TECHNIQUES AVAILABLE TO MANAGE VEGETATION FOR FIRE PROTECTION

Within the fire environment of fuels, weather and topography, the fuel component is the only one that can be modified in the attempt to reduce or eliminate the wildland fire threat. Changing the fuel characteristics can effectively reduce the fire hazard or the fire intensities to a point where the fire threat is manageable. Fuel treatment options range from elimination of all fuels to create a firebreak to reducing the fuel's quantity. These options will be effective in breaking up the continuous fuels and isolating fuels for
your home or development.

1. Hand Clearing - The most common method for the homeowner. Debris must be removed from the site or piled for later burning under safe conditions with a burning permit. Common tools include rakes, axes, shovels, chain saws, pruning saws and the power-string trimmer.

2. Mechanical - A quick method to reduce or remove large amounts of flammable vegetation. Tools and machinery include tractors, mowers and chippers.

3. Grazing - A simple and often overlooked method. Grazing can be a useful method to reduce some grasses and shrubs thereby reducing fuels. Cattle, sheep, goats and other grazers can be employed depending on terrain and vegetation type.

4. Irrigation - During prolonged dry weather, homeowners should irrigate their landscape and surrounding vegetation to increase its live and dead fuel moisture content.

5. Chemical - The application of herbicides either to kill existing plants or to prevent the growth of undesirable vegetation.

6. Thinning - Thinning involves removing a portion of the trees in a given area while leaving others. Various spacing of leave trees can be used depending on objectives. Spacing will usually vary from 10 feet to 20 feet between leave tree crowns.

7. Pruning - Pruning is usually done at the same time as thinning. After the trees to be removed are thinned out, the remaining trees are pruned. Pruning can be used to reduce fuels by removing the lower portion of tree crowns. Both dead and live lower branches are removed during the pruning operation. This removes unwanted ladder fuels that can carry fire from the ground to the tree tops. Pruned trees should retain a minimum of 30% live crown after pruning. That means that at least 30% of the total tree height is composed of live branches.

8. Logging - Selective logging under carefully prescribed conditions will reduce the fuels on a site, and in some locales provide a profit from the harvested trees. Depending on size class and stand conditions, different harvest methods should be used. Methods vary from removing all trees in a given area to removing only selected trees. A trained forester or silviculturist should be consulted to determine the appropriate harvest method. Logging will leave tops and other debris that must be piled and burned, chipped, or taken care of in other ways such as removing from the site.

9. Piling - Piling of residues created by thinning, pruning and/or logging is one way to dispose of the fuel that results from these operations. Piling can be done either by hand, or by machine if there is enough room to operate. Normally, unusable boles, limbs, etc., from thinning and pruning operations, can be bucked up into pieces small enough to hand pile. Unusable logging residue normally requires machine piling. Piles must be kept away from any live vegetation, if the piles are to be burned after they dry out. Small piles can be covered with inexpensive plastic or other material so that the piles can be burned safely during wet weather.

10. Chipping - Another method to reduce the slash is to chip the excess material. This operation leaves small, easily disposed, chips. There are several advantages to chipping. Chipping eliminates the need to burn that can be troublesome due to the chance for escaped fire and smoke dispersion problems. Chipping is normally less expensive than hauling the debris from the site. And, scattering the chips over the site can inhibit grass and shrub growth thus reducing the fine fuels that can carry fire when dry.

11. Prescribed Burning - Prescribed burning is the application of fire to natural vegetation over a broad area. This can be over several hundred acres or as small as a homeowners yard. Prescribed burning can be utilized to reduce the accumulation of flammable debris but must be accomplished under controlled conditions of weather and fuel moisture and must be carried out in compliance with local policies and regulations. Landowners should consult with a fire or fuels management specialist before planning a large prescribed burn.

*Combinations of all of the above treatments can be used effectively depending on vegetation, terrain, and desired objectives.

Tri-County Fire Working Group

Lewis & Clark County is a member of the Tri-County Fire Working Group and acts as the agent for, and employer of the project manager for grant opportunities that fund this Group's active public education and fuel modification programs.

Membership includes citizens, local government, state and federal agencies, interested contractors, and fire suppression departments. Members are from the counties of Lewis & Clark, Jefferson, and Broadwater. This group was the recipient of the FEMA "EXEMPLARY PRACTICES" award in the year 2000 for its outstanding outreach program.

The Group meets monthly. Since it organized following the North Hill fire of 1984, it has had the primary mission of fire prevention education. It undertook a project to map the fuel hazard risk in the interface areas of the counties it represents. When Lewis & Clark County received the Federal Emergency Management Agency "PROJECT IMPACT" grant program, this Group was well suited to be the "fire" committee. The committee found that with the money available for hazard mitigation in general, and with the generous match provided by numerous members, that it was able to step out of the role of talking about fire prevention and mitigation and pursue a very proactive position providing for the completion of projects. The mapping project continues along with the education and awareness programs and fuel hazard reduction in the wildland urban interface.

With the FEMA Project Impact funding no longer available, the committee has been successful in receiving a Hazard Mitigation grant through Montana Disaster and Emergency Services for fuel hazard reduction on City of Helena open space land. The group has been successful in obtaining National Fire Plan Grants in 2001 and 2002 to develop the program for individual defensible space projects, and to develop projects for Non-Industrial Private Forest owners. An application is currently pending for 2004 funds with the West Slope NFP grant program, through the Montana DNRC, to continue this work. Community assistance funding is also in place with the Bureau of Land Management.

Potential Wildland Fire Mitigation Projects within Lewis & Clark County
(See the cost/benefit ranking explanation on page 46.)

Project	Population Impacted	Property Impacted	Project Cost	Cost to Benefit	Priority
Defensible Space (countywide)	High	High	Medium	High	High
Douglas Circle Subdivision	Low	High	Low	High	High
Mountain Heritage Estates	Low	High	Low	High	High
Lincoln Area	High	High	Medium	High	High
Wolf Creek	Low	High	Medium	High	High
Dearborn Area	Low	High	Low	High	High
Front Range	Low	High	Low	Medium	High
FIREWISE	Low	Medium	Low	Medium	High
Education & Awareness (continuous)	High	Low	Low	Medium	High
North Hills Fuel Hazard Reduction (Sieben livestock land)	Low	High	Low	Medium	High
Priest Pass area	Low	High	Low	High	High
Colorado Gulch	Low	High	Low	High	High
Unionville/ South Hills	Low	High	Low	High	High
City of Helena Open Space	Low	Medium	Low	High	High
Marysville area	Low	High	Low	High	High
York area	Low	High	Low	High	High

E. VULNERABILITY ASSESSMENT: DEVELOPMENT TRENDS:

The Helena Valley has been the hub of population growth for Lewis and Clark County. Helena and East Helena populations have remained fairly static over the years, but the valley population in unincorporated areas has exploded. In 1990 there were 13,728 residents in the Helena Valley, and in 2000 the number increased to 18,328, for an increase of 34 per cent.

The number of parcels created through subdivision review has increased substantially in the county since the 1980's. In 1986, 94 lots were created through subdivision review. In 1999, that number increased to 585. Land divisions that were not reviewed created 2020 lots between 1986 and 1999.

A majority of the residential lots outside of the city limits are served by individual wells and on-site wastewater treatment systems.

Development trends in the county show that development is occurring in the 100 and 500-year flood plains and in the Wildland Urban Interface. Development in the floodway is prohibited by the county flood plain ordinance.

Proposed subdivisions are reviewed by the local fire chief, the flood plain administrator and other officials to mitigate the hazards. See the appendix for the form that is used in this important review process. County policy addresses these trends to mitigate the identified hazards in the development areas.

The City of Helena has annexed areas adjacent to the city over the years, but the annexations have been relatively small in size and have not markedly increased the hazard vulnerability of the city. Annexed areas typically have the urban amenities of water, sewer, police and fire protection, and paved roads.

Development in the southeast side of Helena sometimes occurs in the Wildland Urban Interface, which is addressed by the city's subdivision review standards for wildfire.

There are no sawmills or active, large commercial mines in the county.

CAPABILITY ASSESSMENT:

1. LEGAL FRAMEWORK: A number of state and local regulations and policies form the legal basis to implement mitigation policies. These are:

- Montana Subdivision and Platting Act
- Montana Building Codes
- Montana Sanitation in Subdivision Act
- Lewis and Clark County Growth Policy
- City of Helena Growth Policy
- Lewis and Clark County Draft Subdivision Wildfire Mitigation Standards
- City of Helena Floodplain Ordinance
- City of East Helena Floodplain Ordinance
- Lewis and Clark County Floodplain Ordinance

2. GOVERNMENTAL ORGANIZATION:

Lewis and Clark County has a full-time Board of County Commissioners with a full-time Disaster and Emergency Services (DES) Coordinator and an Office of Prevention and Mitigation Manager. The DES coordinator also serves as the county flood plain administrator, and provides DES services for Helena and East Helena. The Community Development and Planning Director is in charge of the planning department, which provides for mitigation implementation through the subdivision review process with the county commissioners.

The City of Helena has a city manager with a part-time mayor and a four-member city council. It also has a Community Development and Planning Director who is in charge of the planning staff and the building department. The senior building official is also the city flood plain administrator.

East Helena has a part-time mayor and four-person city council that makes policy decisions for the city. A full-time public works supervisor is also the floodplain administrator.

3. EXISTING MITIGATION PLANS:

The Lewis and Clark County Mitigation Plan was adopted by the county commissioners in April, 1999. It has served as the mitigation plan for the county, Helena and East Helena.

See the county's CONDITIONS OF APPROVAL USED TO MITIGATE POTENTIAL NATURAL HAZARDS in the appendix. This policy refers to the obligations of landowners and developers to mitigate flooding, fire and earthquake when developing land.

Also in the appendix is the county's Request For Review and Comments that is distributed by the planning department to all agencies that may have a concern about a development regarding mitigation or emergency response. The city of Helena has a similar process to review proposed developments for mitigation measures and emergency response concerns.

The City of Helena's Public Safety Policy addresses mitigation through the enforcement of the Uniform Building Code for public buildings for Seismic Zone 3 and the Uniform Fire Code. It emphasizes mitigation in land use regulation, and prohibits the unsafe use of property through hazardous or incompatible land use relationships.

Helena and Lewis and Clark County both have growth policies that emphasize mitigation in subdivision review.

IV. MITIGATION STRATEGY:

A. LOCAL HAZARD MITIGATION GOALS:

1. Reduce the risk of disasters to life, property and the environment through activities that are performed prior to a disaster. Examples of these activities are:

    a. Hazard analysis – identify and define the major hazards that are most likely to cause a disaster in the county.

    b. Public education – Inform the public about these hazards and promote mitigation in the message.

    c. Land Use – The purest form of mitigation, which prohibits development in high hazard areas, such as floodways, or requires mitigation measures to be adopted before approval of a subdivision by the chief elected officials, such as maintaining drainage ways to facilitate flood flows.

    d. Structural – Elevating homes in the floodplain; putting non-flammable roofs on buildings in the Wildland/Urban Interface; and reinforcing buildings in seismic zones.

    e. Non-structural – Removing heavy objects from high places or fastening items that may fall in earthquake prone areas. Modify wildland fuels by thinning trees or through building fuel breaks.

2. The Lewis and Clark County Growth Policy states that "development in environmentally critical areas, particularly in places identified at high risk for flooding or wildfires, has proven costly for residents, local government and the natural environment." The goal is to encourage new development to locate in area that are relatively free of hazards, and to discourage development within designated 100-year flood plains and to prohibit development in floodways.

B. MITIGATION MEASURES:

FLOOD MITIGATION MEASURES:

CURRENT PRACTICES: Lewis and Clark County will continue to aggressively pursue enrollment in the National Flood Insurance Program Community Rating System. This program emphasizes public education information on flood plains, flood insurance, and on maintaining drainage on private property. The county flood plain administrator receives about 200 telephone calls annually from realtors and the general public seeking information about the flood plain. Public disclosure of a property in the 100-year flood plain is required by the county's flood plain ordinance.

The county also participates in the National Weather Service Severe Weather Week each spring. This is a publicity blitz that promotes flood mitigation and preparedness through the local media: radio, TV and the newspapers. People are told to prepare for spring rainstorms that often cause flooding, and to buy flood insurance, which takes 30 days to take effect. As stated above, the public is also reminded to clear approach culverts and drainages on private property, which cannot be done by county crews.

Lewis and Clark County is a National Weather Service Storm Ready Community, which means that it participates in Severe Weather Week in the spring and fall, and provides public education for storm preparedness.

Project Impact, in partnership with Storm Ready, provided 50 NOAA Weather Radios to all schools in the county, as well as major government buildings. The radios provide for automatic alerts for severe storms. The radios were accompanied by action plans for the building occupants, depending upon the storm.

Lewis and Clark County, and the cities of Helena and East Helena each enforce their respective flood plain ordinances.

The United States Geological Survey received a FEMA grant to restudy Ten Mile Creek from Highway 12 West to the confluence of Prickly Pear Creek and of Silver Creek from Applegate Dr. to I-15. These revisions are currently underway and will revise the 1985 maps for both flood plains in the Helena Valley.

B. PROPOSED FLOOD MITIGATION PROJECTS:

LEWIS AND CLARK COUNTY: (See the appendix for the project locations on a valley map.)

1. Ten Mile Creek jumps its bank south of Mill Rd. and Forestvale Ave. in the West Valley, and washes over these roads north into housing areas. Culverts at low spots along these roads would improve the drainage and prevent floodwaters from swamping that part of the valley. About six 24 inch culverts should mitigate that flooding.

2. Four 18-inch culverts are needed at Sierra Rd. and McHugh Dr. in the West Helena Valley to prevent the Bel Air Subdivision from flooding. This subdivision is in the 500-year flood plain and receives water when Ten Mile Creek, a perched stream, overflows. About 20 homes in the Bel Air Subdivision will receive water during flooding. The cost of a home in that subdivision is about $100,000 each, for a total cost of $2 million. Cost of the culverts is about $40,000, including installation. Estimated flood damage to the homes is conservatively figured at $10,000 per home, for a cost benefit ratio of 5.

3. An eight-foot culvert is required at Wylie Dr. and York Roads to mitigate flooding at that intersection. Cost is about $25,000, including installation. Wylie Dr. and York Rd. in the East Helena Valley suffers from repetitive flooding. An eight to ten foot culvert is required at that intersection. This should be part of the project for the Montana Department of Transportation when the road is redesigned.

4. Emergency access to 12 homes near the Birdseye Rd. and Barrett Rd. area northwest of Helena is denied during flooding. The need is for a four-foot culvert to be placed at the intersection. The culvert has been purchased and the county public works department plans to place it in 2004.

5. A retention pond east of Asarco in East Helena would provide relief from the flooding that East Helena and the East Helena Valley receive from the Elkhorn Mountains in northern Jefferson County. There are two pits there on privately owned ground. Selling the gravel at 50 to 75 cents per cubic yard would help recover costs. The cost benefit for this project would be high, because the ponds would reduce major flooding in the area that inundates homes and roads in East Helena and the East Helena Valley.

6. A bridge is needed at Keir Dr. in the East Helena Valley to provide for emergency access to about 50 homes in the area. This road is usually covered when the floodwaters run high. Cost would be about $250,000. A cost benefit ratio is unavailable at this time because it is unknown how much damage would be reduced by the new bridge.

7. A new bridge is required at Wylie Dr. and Prickly Pear Creek north of East Helena. This would reduce flooding to about 100 homes in the area.

8. Rerouting Silver Creek around the Sewell Subdivision to the south and then back into the culvert under Montana Ave. may substantially reduce flooding in the subdivision.

EXPLANATION OF COST/BENEFIT RANKING FOR PROJECTS		
POPULATION IMPACTED		
HIGH: >1,000	MEDIUM: 500 – 1,000	LOW: <500
PROPERTY IMPACTED & PROJECT COST		
HIGH: >$500,000	MEDIUM: $100,000 - $500,000	LOW: <$100,000
COST/BENEFIT RATIO (Divide the estimated savings from a mitigation project by the project cost.)		
HIGH: >10	MEDIUM: 6 to 10	LOW: 0 to 5

LEWIS & CLARK COUNTY FLOOD MITIGATION PROJECTS

Project	Population Impacted	Property Impacted	Project Cost	Cost/ Benefit Ratio	Priority
1. Forestvale and Mill Rd. culverts	Low	High	Low	High	High
2. Sierra Road culverts	Low	High	Low	High	High
3. Wylie & York Rd. culvert	Low	Medium	Low	Medium	Medium
4. Birdseye & Barrett Roads Culvert	Low	Low	Low	Low	Low
5. East Valley Retention Pond	High	High	High	Medium	Medium
6. Keir Dr. Bridge	Low	High	Medium	Medium	High
7. Wylie Dr. Bridge	Medium	High	Medium	High	High
8. Sewell Subdivision Project	Low	High	Medium	High	High
9. Kmart Retention Ponds	High	High	Medium	High	High
10. LCG Detention Pond	High	High	Medium	High	High
11. Davis ST. Detention Pond	High	High	Medium	High	Medium
12. Prickly Pear Creek Wall	Low	High	Medium	Low	High

CITY OF HELENA: (Taken from the draft Storm Water Master Plan.)

9. Improve the Kmart retention ponds to possibly include wetlands. These ponds retain water that contribute to flooding of the East Helena Valley. The ponds also need to be improved to expand the retention capacity. The current ponds overflow during heavy runoff. The water moves northwest of I-15 and easterly along Custer Ave. until it crosses Custer and heads north again. The water then runs into the Helena Valley Irrigation Canal, and runs out downstream into the Helena Valley as the canal constricts. Estimated cost is $328,000.

10. Build a detention pond in the upper to the middle reaches of Last Chance Gulch. This facility would detain water from going downhill into the downtown and Great Northern Center areas, which are the sites of millions of dollars of new and old developments. Cost is estimated to be $416,000.

11. Build a detention pond in the upper reaches of Davis Gulch to prevent floodwaters from running through the south side of the city into concentrations of homes. Estimated cost is $420,000.

CITY OF EAST HELENA: (Taken from the Capital Improvement Plan.)

12. Increase the carrying capacity of Prickly Pear Creek in East Helena by replacing the section of the existing cobble wall along the stream and by putting in a new parapet wall along the east and west banks of the stream, which includes the 56 feet of new retaining wall. Flooding from Prickly pear Creek impacts much of the town, and this project should greatly reduce East Helena's ongoing flood problem.

This project will reduce the need for sandbagging each time the stream runs high during floods. The estimated cost is $160,000. The cost benefit ratio is about three, because there are at least $500,000 worth of homes and infrastructure that are flooded when Prickly Pear Creek overtops its banks.

The project would begin at the crossing of Pacific Street and continue about 1420 downstream, about 450 feet past Riggs Street.

C: EARTHQUAKE MITIGATION MEASURES:

1. CURRENT PRACTICES:

SCHOOLS: All schools in Lewis and Clark County, and the cities of Helena and East Helena have earthquake drills beginning in October for the new school year. The schools have at least one drill yearly, and most schools have earthquake drills two to three times per year.

All schools also have three-millimeter window film on all windows to prevent implosion during an earthquake, which could cause serious injuries with flying shards of glass.

The purpose of the month's activities is to exercise earthquake drills in city and county buildings, as well as all of the schools. It also provides the public with earthquake preparedness information through a media blitz in the newspapers, radio and TV stations. Every October Earthquake Preparedness Month flyers are distributed to hundreds of employees of Helena's largest employers. One minute Public Service Announcements on earthquake preparedness are played during October on Helen's three radio stations.

Public education is used to inform the public of the earthquake hazard, and then encourage preparation steps through family disaster kits, drills and non-structural mitigation activities.

Thousands of people are reached by the campaign, which has become institutionalized in Lewis and Clark County. It has become so successful, that the State of Montana Disaster and Emergency Services Division has adopted the program for the rest of the state to promote earthquake preparedness. The Western States Seismic Policy Council awarded Montana an award for outstanding public outreach and education in 1998.

PROPOSED EARTHQUAKE MITIGATION PROJECTS:

1. Seek funding through grants to encourage homeowners to structurally retrofit their homes. Hundreds of homes, especially the older ones in Helena and East Helena, need to be strengthened structurally. Homeowners could contract with the Helena Building Division to have their homes inspected for seismic retrofit. This could include, but not be limited to, bolting sill plates to the foundation, sheathing cripple walls, bracing second stories over garages and removing or reinforcing brick chimneys.

Homeowners would pay 25 per cent of the cost for the project, and a FEMA Pre-Disaster Mitigation grant would pay for the remaining 75 per cent. A maximum of $6,000 would be spent per house. The average cost of homes in the Helena area is about $125,000, so the cost benefit ration would be high, assuming the retrofit would save the house.

2. The Helena School District could use the Potential Structural Seismic Hazards analysis for schools to determine if it wants to pursue a structural mitigation project for one or more of the schools. Funding sources would be identified to provide for the local 25 per cent of the match for a grant.

3. Provide strapping materials for homeowners to strap down their water heaters, which typically topple over in an earthquake and break the gas line. The materials could be made available from a FEMA PDM grant and the homeowner's labor could be counted as the 25 per cent match.

4. Continue to promote Earthquake Preparedness Month each October to remind the public of the earthquake risk in the Helena Valley. Earthquake drills in schools and public buildings should continue to train students and the public to take protective measures when the ground shakes. Non-structural earthquake projects, such as strapping down water heaters, will be promoted.

5. Promote a brick chimney removal mitigation project to encourage homeowners to either remove their brick chimneys or to mitigate this earthquake hazard by replacing it with a metal pipe. Chimneys are the weak link in a building, and tend to topple readily when the ground shakes, falling through roofs or hitting people near the building.

EARTHQUAKE MITIGATION PROJECTS

PROJECT	POPULATION IMPACTED	PROPERTY IMPACTED	PROJECT COST	COST/BENEFIT RATIO	PRIORITY
HOME RETROFIT	LOW	HIGH	LOW	HIGH	MEDIUM
SCHOOL RETROFIT	MEDIUM	HIGH	HIGH	MEDIUM	MEDIUM
WATER HEATER STRAPPING	LOW	HIGH	LOW	HIGH	HIGH
CHIMNEY REMOVAL	LOW	MEDIUM	LOW	LOW	LOW
EARTHQUAKE PREPAREDNESS MONTH	HIGH	MEDIUM	LOW	MEDIUM	HIGH

C. IMPLEMENTATION OF MITIGATION MEASURES:

Mitigation measures will be implemented through the Local Emergency Planning Committee flood and earthquake subcommittee, and the Tri-County Fire Working Group.

The projects will be prioritized using a cost/benefit analysis to determine the cost benefits of a project. Estimated savings of life and property will also enter into the equation to make this determination. See the attached tables on mitigation projects.

As noted throughout this plan, the mechanisms exist for continued mitigation progress in Lewis and Clark County, Helena and East Helena. Capital improvement plans for each jurisdiction are continually revised and updated to bring the best projects forward for funding.

And just as importantly, the chief elected officials and department heads in each jurisdiction fully support the mitigation goals documented in this plan.

LAND USE PLANNING PROPOSALS

The Lewis and Clark County Growth Policy was adopted by the county commissioners in December, 2000 and revised in December, 2003. The policy addresses growth in the hazardous areas, including the flood plain, Wildland Urban Interface and earthquake fault zones.

PLAN MAINTENANCE PROCEDURES

A. The plan will be monitored, evaluated and updated annually by the PDM Steering Committee and the subcommittees on flood, wildfire and earthquake.

B. Lewis and Clark County, The City of Helena and the City of East Helena have capital improvement plans that are natural avenues to generate projects for the mitigation plan. Lewis and Clark County and the City of Helena have comprehensive plans that establish policy for growth and mitigating hazards in the county and city. To illustrate the relationship between capital improvement and mitigation plans, the City of Helena and City of East Helena projects came from their capital improvement plans. These plans provide a platform for the introduction and implementation of mitigation projects that should reduce the effects of disasters from wildfire, flood and earthquake in the county.

C. The county and city public works departments annually review their budgets to consider mitigation projects that would reduce damage to public infrastructure. Completed projects are reviewed to determine mitigation results.

D. Public participation in the plan maintenance process is important, and it will be accommodated through public forums, such as meetings, and use of the city and county web sites that will provide for public comment.

APPENDICES

1. Letter of transmittal
2. Population density map.
3. Record of public meetings and public information.
4. Flood plain maps.
5. Critical facility maps.
6. School seismic surveys.
7. Fuel hazard map.
8. Flood mitigation projects map.
9. Planning Request for Review and Comments form.
10. Conditions of Approval hazard Mitigation form.
11. Resolutions Approving the Plan.